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RM-5140-TAB
NOVEMBER 1966

DIMENSIONS OF SURVIVAL: POSTATTACK SURVIVAL DISPARITIES AND NATIONAL VIABILITY

Norman Hanunian

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PREFACE

This Memorandum is one of several reporting on work done for the United States Atomic Energy Commission, Division of Biology and Medicine, Technical Analysis Branch (TAB), on the biological and environmental consequences of nuclear war. Here, particular attention is paid to the possible attack-created disparities among various demographic and economic components that might survive such a war.

This work complements earlier RAND efforts, notably RAND Memorandum RM-3436-PR, Economic Viability After Thermonuclear War: The Limits of Feasible Production, by S. G. Winter, Jr., September 1963, and RAND Report R-322-RC, Report on a Study of Non-military Defense, July 1, 1958.

SUMMARY

This study was designed to explore the compositional changes that massive nuclear attack might produce in America's societal structure. However, estimates of overall survival magnitudes--in terms of the usual gross indicators--have been included among the study's outputs. Such estimates are worthwhile both because they establish a frame of reference against which to view compositional changes, and because they constitute a key, enabling readers to place our results in register with those of related investigations and even with some historic catastrophes.

There are, of course, pitfalls involved in comparing the magnitudes of actual catastrophes, as recorded, with the calculated outcomes of hypothesized events, and such comparisons should be interpreted with caution. For one thing, records of catastrophes that have already been experienced presumably take account of whatever damage mechanisms were operative. Estimates of the damage that nuclear attacks might produce, by contrast, take account only of selected damage mechanisms. While the mechanisms selected for treatment are perhaps the most important ones, there is at least a strong possibility that neglected mechanisms are also important. Conventional estimates of the damage to be expected from nuclear attacks may thus very well be substantial understatements.

It is thus doubly impressive when, after briefly noting (1) the consequences of the Black Death and (2) the World War II experiences of Japan, Poland, and the USSR, we discover that the worst of these historic events falls somewhat short of matching our calculated outcomes for certain massive nuclear attacks that we saw fit to model.

The Plague and associated calamities probably reduced Europe's population by 40 percent within the course of a single generation. World War II left Japan with its population little changed, but 25 percent of her capital was lost. Poland suffered something like a 15 percent excess mortality rate, and the resulting difficulties were aggravated by other disruptive influences (major boundary shifts and the population flows they precipitated). The Soviet Union's population suffered 12 or 13 percent excess mortalities, while more than 25 percent of her reproducible wealth was consumed.

Enormous though the catastrophes indicated by the figures just cited must have been, the range of nuclear attacks we chose to model includes far greater damage--even as we calculate it. The eight attacks that we devised (against five target systems) deliver between 800 megatons and 13,200 megatons. Taking account of both prompt effects and residual radiation, we calculated the resulting fatality rates to range between 3 and 60 percent of the U.S. population. Calculated loss rates for capital tend to be much lower than for population, approximating, at worst, the Soviet and Japanese experiences in World War II.

While the amount of damage is of course primarily influenced by the megatonnage delivered, it is also sensitive to the nature of the target system. Attacks directed mainly at such military installations as missile launch facilities, which are located far from population nodes, do relatively little damage to civilian entities. This points up the value of siting any installations that are considered likely to be targeted outside densely populated regions and well away from large cities.

Wind conditions are, of course, determinants of the distribution of fallout. Experimentation with a number of exemplar winds reveals that nationwide results are moderately sensitive to this factor, regional results much more so.

Some of the more striking results of the study relate to lesser aggregates.

Attack impacts vary impressively among regions. While our eight attacks can hardly exhaust the set of possibilities in this respect, we find certain regions tending to suffer relative to others. The Southeast and the Pacific Northwest generally fare better than average, the Northeast and especially California, worse. Further, at least where heavy attacks are concerned, whatever region fares worst <u>typically</u> experiences a survival rate less than half that of the region faring best--and far more extreme cases can be found.

Examining another disaggregation of the nation's population, we note that urban people tend to fare much worse than farm people. Not only is it usually the urban people who fare badly, but in those

instances when survival rates for the two groups are particularly disparate, it is always the urban people who fare badly.

We consider the possibility that nuclear attacks would affect different age groups in different degree, and develop a model that permits us to quantify the differences. According to one tentative computation with this model, a (representative) heavy attack that killed 54 percent of all people would kill 47 percent of those 5 to 64 years old, 74 percent of all children under 5, and 87 percent of people 65 and over. In short, this calculation shows that people whose ages at the time of attack placed them very near either end of the normal life span would have extraordinarily poor chances of survival.

Another investigation reveals that nuclear attacks would tend to discriminate against high-income families. Families with 1959 incomes of $10,000 or more (such families account for one-third of all income generated) would survive at rates only 75 or 85 percent as high as those for the general population. Such a prospect is of interest because, among other reasons, it implies that attacks are apt to eliminate selectively persons nowadays deemed exceptionally productive.

The incidence of broken families, in consequence of nuclear attack, is also explored--though only for a somewhat special case. The general dearth of data useable for this purpose is overcome by resort to materials generated during a study of urban transportation requirements in one metropolis (Chicago). We used Chicago as an exemplar. Results are, of course, highly dependent on weight of attack. However, it is found, for example, that no more than one-fifth of all preattack families would survive an attack in which the survival rate among individuals was two-fifths. Such calculations call attention to a fact that we are otherwise all too apt to lose sight of: that low survival rates for individuals imply very low survival rates for intact families.

The study proceeds from consideration of essentially demographic entities to economic ones, examining the full range of economic activities by reference to a disaggregation of the labor force and to certain other indicators. As before, it is only between urban and farm entities that large disparities are usual. Nevertheless, it is shown that

workers in wholesale and retail trade, in construction, and in education tend to fare somewhat better than average, while those in finance, insurance, and real estate and in public administration tend to fare worse. (That the latter two categories fare relatively badly reflects their concentration in New York and in Washington, D.C., respectively, and a tendency for such cities to be attacked.) Among elements of the farm sector, it is the city-oriented activities--notably dairying and poultry raising--that tend to suffer. Disparities are very small in national results, however.

In the end, it is clear that nationwide results generated with respect to economic variables seldom show any very consequential-looking disparities except where farm entities are compared with nonfarm entities. And there the comparisons generally favor the farm entities. That is, the farm sector tends to suffer relatively less under attack.

Since competent analysts have expressed the view that the farm sector is peculiarly likely to be the one that jeopardizes the economy's postattack viability, and since our calculated results are more congenial to the opposite view, it seemed appropriate to elaborate on our modeling, introducing such further realism as we could manage, and to see whether this would alter the thrust of our evidence.

This we accomplished, using a Cobb-Douglas model to take account of the contributions to output made by surviving labor and capital. (Since the two factors tend to survive in very different proportions, it is in principle important to take account of both.) However, results for the farm and nonfarm sectors, when compared, accord with impressions gained previously from inspection of survival rates for such elemental entities as farm and urban components of the labor force. In short, from the standpoint of resource availability, it does not appear that the farm sector would pose a problem. (While it is not obvious that the farm sector would pose a problem for other reasons, the reasons on which heavy reliance is placed--ecological disturbances, changes in climate, etc.--are not susceptible to evaluation here.)

ACKNOWLEDGMENTS

It is among the great advantages of working within an organization such as RAND that the boundaries of an investigation can be established with more regard for what is appropriate to the subject matter than for what falls within the personal resources of an interested researcher.

If the study being reported on here is from one point of view an individual effort, having been conceived in its broadest outlines and structured in all its substantive aspects by the undersigned, it is, thus, from another point of view very much a product of the RAND organization. For the study has had the benefit of support at every stage. I refer not only to computational support--though that bulked very large indeed--but to advice and counsel that was available as needed. Let me indicate the nature of the latter first.

The fact that I was, in some part, working at or near the limits of my competence made such support especially important. Particular instances are typically unimpressive, and I suppose that the counselors will ordinarily have forgotten the counsel they gave. Yet the aggregate effect is anything but negligible.

The support meant, for example, that I was occasionally led to an especially efficient starting point for searching out information on some topic, or that I was advised to abandon what only the specialist consulted could know would prove a fruitless data search. It meant that I had little cause to fear neglecting some significant variable--even if the significance had only recently been established via work in a related field. And in the end it meant, as colleagues questioned one aspect or another of the results I reported, that I came to understand those results better.

I don't suppose that the colleagues who provided counsel from time to time as occasions arose would much benefit from being identified here, and so I shall leave the acknowledgment an impersonal one. But this study is much the better for having had such support, and I am more grateful than those who counseled me can know.

Beyond that, I want to acknowledge specifically the contributions of J. E. Hill, H. H. Mitchell, M.D., D. E. Oyster, R. D. Specht, and

S. G. Winter, Jr., who were kind enough to read this Memorandum in draft and to make many valued suggestions for its improvement.

There was support of another kind, too. Because the study being reported on here was quantitative in all its parts, RAND's data processing facilities and the skills of its programmers have both been essential ingredients.

N. D. Cohen undertook a major revision of the Quick Count (attack evaluation) program so that it would serve the needs of this study. In particular, he gave it the capability of treating a large number of populations simultaneously and efficiently, at the same time separating hazard calculation from damage assessment so that separate physical vulnerability assumptions could be made for the various populations.

Dean Hatch programmed the many manipulations of input data that were necessary to reconcile and to integrate information from several sources into population representations suitable for use in Quick Count. Further, he prepared programs for preliminary evaluations of attack elements. And, finally, he supervised most of the data generation, from the earliest preliminaries to the finished Quick Count output.

R. J. Eggleton (with George Levesque) authored programs for ascertaining attack effects on family structure in an exemplar locality.

A special acknowledgment is due to D. T. Rumford. On this, as on other occasions, I found Tracy's friendly interest to be most helpful in facilitating communication with people in RAND's Computer Sciences Department.

Of course, some data reduction remained to be accomplished outside the Computer Sciences Department. Doreen LaBahn, Jo Ann Lockett, Mary Jo Parise, and Mary Jane Penzo each participated at one time or another.

Norman Hanunian

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I. INTRODUCTION

The state of society after hypothetical nuclear attack has by now been a subject for analysis or comment in a great many studies. Usually, however, such treatments have been quantitative only in narrowly circumscribed areas. A single indicator, people surviving, is often relied upon to convey what it can about societal survival. Less frequently a second measure is added. When this is MVA,* as is typical, it may serve both to call attention to differences in vulnerability between the human population and that of its material resources, and also to hint at the adequacy of the surviving economy.

On those rarer occasions when initial postattack conditions have been quantified more elaborately, it has tended to be in the context of some special interest--e.g., the availability of military personnel, or of medical doctors, facilities, and supplies; or the feasibility of retaining familiar preattack technological relationships in industry; or the adequacy of foodstuff supplies. On virtually all such occasions, particular subject areas have been dealt with in considerable detail, but only at the cost of giving other areas short shrift. And because funding has usually come from military or civil defense authorities, whose special obligations do not extend much beyond the immediate postattack period, those studies have tended to concentrate on the short run.

The result has been a large number of investigations into selected aspects of the postattack situation, but almost none that has attempted great breadth along with depth. Mostly, as we have said, analysts have contented themselves with estimating the number of human survivors. Even on those relatively rare occasions, however, when they have gone _much_ farther and, in addition to inventorying what survives, begun to appraise its functional adequacy, analysts have stopped well short of achieving definitive results.

For example, researchers have devoted great effort to exploring the feasibility of survivors maintaining themselves through reactivation of undestroyed production facilities. Yet the process by which survivors might reorganize to achieve that end has pretty much been left

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*Value added by manufacture.

to the imagination. Analysts have instead concentrated their modeling efforts on what is essentially only a set of technological interrelationships among economic activities, and have modeled these as they exist in peacetime. Just how appropriate peacetime relationships would be in postattack circumstances is of course questionable to say the least. It is widely recognized that the uneven impact of attack <u>might</u> alter relative scarcities and make different production relations preferable. Further, it is granted that, with the environment drastically altered in the aftermath of attack, the structure of final demand might change and contribute to a similar result. But the problem is larger than that. What the modelers have been doing is transplanting a set of production relations from an environment which has been compatible with it in every dimension to one whose character--and hence compatibility--is left largely unexplored. This is not to deny the value of establishing whether surviving productive facilities could function in the old way if only they had the good fortune to be imbedded in a suitable environment. Indeed, industry's potential for functioning as before must surely be one of the determinants of whether the environment would be compatible. But major reservations are nevertheless appropriate. The points to which we want to call attention are (1) that feasibility tests thus far performed have been conditional ones, (2) that they have not been accompanied by convincing argument to the effect that the conditions would be met, and (3) that, therefore, such favorable outcomes of the feasibility tests as have been reported are farther from being predictions than we may like to think.

After a full-scale attack society would not only be missing some substantial fraction of its members, but it would have to make do with an economy that had been reduced in size, distorted in composition, and disrupted in all its interrelations (internal and external). It may not be altogether inconceivable that an economy so afflicted could quickly reorganize and then recuperate smoothly and within a few years, but no reassuringly detailed account of just how it might be done seems yet to have been constructed. Reference to such disruptions as have been experienced in recorded time can be used to support a more dismal view.

If we are ever to succeed in predicting whether a postattack society would be viable, we shall have to base our predictions on a much more elaborate appreciation of what might survive than can be gotten by reference to analyses so far reported. We shall have to understand how closely the set of surviving elements would resemble that now extant. Social (including economic) institutions as they exist represent accommodations to a particular set of circumstances and to the historical evolution of those circumstances. The more drastically attacks would alter preexisting circumstances, the less likely it would become that institutions-in-being could continue to function adequately.

We are by no means in a position to give quantitative expression to all the ways in which attacks might alter significant circumstances. But it is evident that the impact of attacks might be quite uneven: some parts of the nation's people, institutions, and resources would survive in disproportionate numbers. Disparities will be a principal concern here. We shall be looking behind the usual broad aggregates and elaborating where it appears useful to do so. Since this is not a first exploration of the general subject area, points that are already familiar will occasionally come into view. We shall welcome their appearance for the perspective they provide, and add information about them if we can. But our focus will be elsewhere.

We inquire not only into how many people might survive but we ask what the attributes of these survivors might be--in terms of age, productivity, industrial affiliation, and family ties. That is, we attempt not merely to count survivors as undifferentiated individuals but to identify them with functional groups in ways calculated to facilitate investigation of the significance of such survivors. Our concern is as much with economic and other social entities as it is with people as individuals. Our purpose is to note substantial disparities, and to reflect upon their significance.

Inevitably our achievements will fall short of meeting our ambitions, and this is particularly so where determinations of significance are concerned. The state of the art has not advanced to the point where definitive appraisals of significance are possible, and in the

end practicality will be an important consideration affecting our choice of analytical tools.

Throughout, we use a quantitative approach. The study proceeds by developing the implications of particular attacks. It should be noted at the outset, however, that our aim is not to predict the outcome of nuclear war. The calculations that are made are made solely for the purpose of illustrating what variations in outcome would result from certain input variations. Attack weights and targeting are quite hypothetical. As explained later, they derive from a desire to cover fairly well the range of interesting outcomes; they are <u>not</u> based on Intelligence estimates of any nation's capabilities or intentions. Even so, certain possibilities are neglected, among them CW, BW, and RW weapons, and MIRV.

Section II, which follows, presents an overview of our results, providing first a background for the sake of perspective.

Section III describes the principal procedures and assumptions.

Sections IV and V detail results for demographic and economic entities, respectively.

Concluding reflections are offered in Sec. VI.

Some modeling considerations are discussed in Appendix A, while Appendix B presents extensive hazard tabulations with respect to all attacks considered.

II. OVERVIEW: SURVIVAL MAGNITUDES

INTRODUCTION

While this study was designed to explore the compositional changes that massive nuclear attack might produce in America's societal structure, the study's outputs nevertheless include estimates of overall survival magnitudes in terms of the usual gross indicators. These estimates are worth noting both because they establish a frame of reference against which to view the detailed results we shall describe later, and because they constitute a key, enabling readers to place our results in register with those of related investigations.*

As we shall see, certain of the cases to be considered involve attacks so severe that readers may wonder, on being confronted with estimates of the implied overall survival, whether further analysis of those cases can serve any useful purpose. Sometimes the question does indeed seem a moot one. However, no satisfactory basis has yet been developed for defining a threshold beyond which we can conclude that all would be lost. Relevant theory is incomplete and unreliable.** A wiser approach to bolstering our intuition in these connections may be that of examining civilizations' past responses to major stresses. Reference to historical experience reveals instances of regeneration occurring in the aftermath of remarkably heavy losses. It may be orienting if we digress long enough to cite some of these here.

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*We should remind readers, however, that for various reasons (pp. 3, 65, 66, and passim) these estimates of survival levels should be regarded merely as particular quantitative implications of the model we have used; they are not intended to be predictive of how much damage nuclear war would actually entail.

**Attempts to project regeneration of the populace, the economy, etc., in such connections may merit attention for technical reasons, but the present state of the art is not such that much faith ought to be placed in their substantive results. They are too critically dependent on wholly arbitrary assumptions about the sorts of institutions and outlooks that would emerge in the postattack period.

SOME HISTORICAL POINTS OF REFERENCE

Plague

One of the greatest calamities of recorded time was associated with the Plague. In the fourteenth century, war, famine, and especially recurrent plague combined to reduce the population of Europe drastically--probably by more than 40 percent within the time-span of a single generation.* Moreover, the bulk of this change seems to have occurred within a much shorter time; it has been estimated that Europe's population fell by 25 percent just during the Black Death of 1348-50.**

Here, then, was a catastrophe of enormous proportions. The population loss was so great that major institutional accommodations were fostered. The unaccustomed abundance of capital relative to the depleted population, and particularly relative to labor, imposed new strains on feudal ties, and these gradually gave way. The feudal system was thus indirectly a casualty. But the social structure accommodated, rather than broke, so that in a fundamental sense society can be said to have survived. Recovery was anything but swift, however. More than a century seems to have passed before the population losses were made up.***

Japan's Wartime Losses

World War II was a notably disastrous experience for several of the participating nations. However, large population losses were not invariably a feature of those catastrophes. Japan actually managed a net population gain during the war years, natural increase more than

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*See Pirenne, Henri, Economic and Social History of Medieval Europe, p. 195.

**Hirshleifer, Jack, Disaster and Recovery: The Black Death in Western Europe, The RAND Corporation, RM-4700-TAB, February 1966, p. 27.

***I have been drawing on the two sources just cited. Pirenne's work is a classic in its field. Hirshleifer's is concentrated on matters of interest here, is shorter overall, and benefits from more recent historical researches.

offsetting losses attributable to military action; yet it is clear enough from other measures that she suffered heavily.

When the war began, Japan was a major maritime power. At its end the merchant tonnage surviving was only one-fifth the prewar total.* Other sectors fared somewhat better but the aggregate damage was impressive. About 100,000 tons of high explosives and incendiaries were dropped on 66 Japanese cities during the final months of the war, destroying more than 40 percent of their built-up area and leaving millions of people homeless.** And if to attack damage we add damage from all other causes (fire, flood, demolition for firebreaks, etc.), we find that nearly one-quarter of all Japanese dwelling units were destroyed during the war years.***

Damage to other sectors varied. Agriculture was affected only indirectly, attacks having been directed primarily at cities. Bombing attacks and wartime abuse combined to reduce the capacity of thermal power generating stations to four-fifths of the prewar level by war's end.**** Petroleum refineries, attacked directly, fared worse. Less than one-third of peak prewar capacity survived.***** Nonessential industries sometimes suffered from having machinery dismantled and removed for scrap, as well as from bombing, abuse, and ordinary wear. As a result, only 20 percent of the spindles formerly used by the cotton spinning industry still existed in Japan when the war ended,******

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*A major wartime shipbuilding effort had failed to keep pace with sinkings. Japan lost some 8 million tons of merchant ships to enemy action during 1941-1945 (which is to say that Japan alone lost ships equal to more than one-tenth of the world supply during that era!).

Cf. Japan in Industry, 1954, The Oriental Economist, Tokyo, esp. p. 99. Also, Statistical Abstract of the United States, 1962, p. 604.

**The Effects of Air Attack on the Japanese Urban Economy, U.S. Strategic Bombing Survey Report, March 1947. See Preface and pp. 4-7.

***Cohen, Jerome B., Japan's Economy in War and Reconstruction, University of Minnesota Press, 1949, p. 407.

****Japan in Industry, 1954, The Oriental Economist, Tokyo, pp. 81, 82.

*****Ibid., p. 220.

******Ibid., p. 5.

and rayon yarn capacity had been reduced almost as much.* The textile processing industry suffered much the same fate, and only 20 percent of its prewar capacity remained at the end of 1945.**

All in all, it has been estimated that between 1941 and 1945 Japan's aggregate losses of physical capital amounted to 4.2 billion yen.*** In real terms, this is roughly equivalent to her entire GNP for 1940, and apparently constituted quite a substantial proportion of the reproducible wealth that she had been able to accumulate. Just how large this proportion was cannot be determined with any accuracy, but one investigator has concluded it was 25 percent. This accords with such evidence as we have been able to adduce. That is, defensible calculations, precarious though they may be, indicate that during the course of her participation in World War II Japan lost in the neighborhood of 25 percent of all her reproducible wealth.****

Yet it took only about a decade for her to generate replacements for the lost capital and to reach and surpass prewar GNP levels.*****

World War II Losses in Eastern Europe: Poland

It was in eastern Europe that World War II proved most devastating. There Poland suffered excess deaths amounting to perhaps 15 percent of her total population. That is, the population of postwar Poland was about 15 percent smaller than it would have been had some way been found to avoid the excess mortalities that were occasioned by

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*Ibid., p. 58.

**Ibid., pp. 64, 65.

***This estimate, by what was then the Economic Stabilization Board, is reported in Japan Economic Year Book, 1954, Oriental Economist, Tokyo. See pp. 20, 21.

****Fuji Bank Bulletin, 4 April 1966, p. 61.

*****A more extensive examination of the Japanese experience will be found in Hirshleifer, op. cit.

the war.* This rate is of course less than that experienced during the catastrophic fourteenth century, but not incomparably so.

The full toll in that earlier period, it will be recalled, was taken over the course of more than a generation. We have only to go back as far as the first world war to find another occasion on which the Poles suffered a great many excess deaths. Taken together, these two wars cost the Poles 25 percent or 30 percent of their number.** As we have already noted, the cumulating catastrophes of the fourteenth century killed 40 percent of Europe's population over a similar span of years.***

If we restructure the comparison, and confront Poland's excess death rate during World War II with the highest rate encountered during a similar period in the fourteenth century, the results are proportionately much the same: 15 percent for Poland between 1939 and 1945, and 25 percent for Europe during the Black Death of 1348-1350.

It is clear, then, that in terms of mortality rates the modern experience constituted a smaller stress. But we should reserve judgment until we have taken account of other dimensions (capital wastage, territorial losses, and disruption) as well.

Let us turn now to capital losses. World War II appears to have been about as destructive of Poland's material wealth as it was of her people. (The main causes of fourteenth century deaths--plague and famine--could of course have had no direct effect upon Europe's accumulated capital.) Some insight into the amount of physical damage occasioned by World War II is afforded through examination of Poland's housing statistics. A 1946 census tallied 1.9 million urban dwellings,

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*Mauldin, W. Parker, and Donald S. Akers, <u>The Population of Poland</u>, Bureau of the Census, U.S. Department of Commerce, USGPO, 1954.

According to this source, excess deaths probably numbered nearly 4 million, but uncertainties are large and the true number could conceivably be as low as 2 million or as high as 7 million--unlikely though these extremes are.

Cf. pp. 30, 31, and Appendix C of the work cited.

**Cf. ibid., p. 32.

***Page 6.

assertedly 32 percent fewer than the comparable prewar figure.*
Structural damage was less in rural areas, and indications are that only about 17 percent of all farms had been destroyed or severely damaged.** Over the nation as a whole, we may infer that perhaps 20 percent or 25 percent of all dwellings were unavailable in the immediate aftermath of war. However, since destruction had often been incomplete, repairs, modifications, and other accommodations restored many of the units to availability within a very few years. Probably no more than about 15 percent of all dwellings had been damaged beyond repair.***

Losses of Poland's reproducible wealth were of course not limited to the housing sector. Factories had been stripped of machinery and burned, key highway and railway bridges had been demolished, and a very large part of all farm animals had been killed or driven away.**** We can hardly expect that reliable statistics would have been gathered during so thoroughly disrupted a period, or that the sort we should want would subsequently have been pieced together with suitable objectivity. Perhaps the best way to convey an impression of the state of affairs in postwar Poland is by means of a few vignettes. We quote from the official history of UNRRA and from UNRRA working papers:

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*Quoted in United Nations, Economic Commission for Europe, The European Housing Situation, p. 30.

We may not be justified in inferring that the 32 percent figure represents only dwellings damaged beyond habitability. There had been some temporary diversion of dwellings to other uses in the wake of damage to offices, schools, etc.

**Ibid., p. 31.

***This is our conjecture, based primarily on material in the U.N. document cited above. (Recall the footnote next but one above.)

Losses appear somewhat more severe in terms of dwelling rooms. Compare Housing in the European Satellites, 1949-1958, CIA, September 1958 (Unclassified--For Official Use Only).

****Woodbridge, George W. (ed.), UNRRA: The History of the United Nations Relief and Rehabilitation Administration, Columbia University Press, N.Y., 1950, Vol. II, p. 200.

The UNRRA historians had available to them, in addition to endogenous Polish sources, the reports of on-the-scene observers (some American) who staffed UNRRA missions at seven major cities in Poland.

> Warsaw was a vast rubble heap; in the surrounding countryside people were for the most part living in cellars and dugouts.*
>
> Large ships could be handled in the relatively undamaged port installations of Danzig, but rail facilities had been so thoroughly destroyed that the 250-mile journey to Warsaw at first took three to five weeks. Consequently only enough supplies were off-loaded to permit the lightened vessels to enter the wreckage-strewn channel to Gdynia, from which goods could be more speedily dispatched on the less damaged railways leading out of that city. The available stevedores were untrained, weak from malnutrition, and so hungry that the UNRRA official on hand found it hard to blame them for pilfering food. No locomotives were at the dock to move freight cars to the warehouses; there were no trucks, manpower, such as it was, constituted the only substitute.**
>
> The long continuing drought which Poland, in common with most of Europe, experienced in the winter of 1945-1946 was only a final factor added to a series of adverse circumstances. Large areas in the devastated regions and the ex-German provinces had not been planted because the battle areas were as yet unreclaimed and populations were still being shifted; moreover, seed was scarce and draft animals few. Even the planted sections yielded little, not only because of the bad weather but because the untended fields had become choked with weeds during the war years, and fertilizers, customarily used in large quantities, were unavailable. The tremendous losses in cattle, pigs, sheep, and poultry had, moreover, severely cut the local supplies of fats and oils, meat, and dairy products.***
>
> In fact, as late as spring 1946, an urgent request was received by UNRRA for mine detecting equipment because of the casualties still occurring from unexploded mines. ... In Lower Silesia and in the bridgehead areas north and south of Warsaw, good farm land is still dotted with land mines. ... ****

Thus the picture seems a somber one whether we view it in terms of fatality rates, in terms of the proportion of housing lost, or in the varied but vaguer terms of the passages just quoted. In addition to

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*Woodbridge, loc. cit.
Warsaw was the site of an UNRRA mission.

**Ibid., Vol. II, p. 212.

***Ibid., Vol. II, pp. 217, 218.

****UNRRA, Agriculture and Food in Poland (Revised), Operational Analysis Papers, No. 30, London, March 1947, p. 9.

all this, there was suffering that resulted from territorial changes. But, as we shall see, there is an important sense in which territorial changes were beneficial. We turn now to consideration of boundary changes and of their import.

Of the territory Poland held during the years between the two World Wars, only a little more than half remained. The rest had been ceded to the USSR. Postwar Poland was not smaller to anything like that extent, however, because she had at the same time gained some territories (mostly on her western border) at Germany's expense. In fact, one-third of the territory Poland now administers was German during the interwar years. What all this amounts to is that Poland's boundaries had moved westward a substantial distance--by roughly 30 percent of the country's width (somewhat more in the east, less in the west, so that her total area became one-fifth smaller than it had been).[*]

Such territorial shifts must, of course, have been extremely disrupting in themselves. But with them came new pressures on populations in the transferred territories, and many people moved as a result. While only about one in every seven persons (two out of five Polish-speaking persons) residing on land relinquished by Poland elected to move westward in order to remain Polish citizens,[**] most residents of the territories acquired from Germany either fled or were expelled when authority passed to the Poles: only 30 percent stayed on.[***]

The Polish government then sought to repopulate these areas, beginning by settling on them Poles repatriated from provinces ceded to the USSR.[****] The condition of housing and productive resources in these areas made this difficult. All of eastern Europe had suffered capital wastage, these areas by no means least. Nevertheless, the

[*] Mauldin, W. Parker, and Donald S. Akers, op. cit., cf. pp. 13-16, 103.

[**] Ibid., p. 29.

[***] Cf. Ibid., pp. 29, 103.

[****] Ibid., p. 62.

resettlement was accomplished. What interests us here is the disruptive effect of population movements on such a scale--several millions of people moved. Disruption must have been enormous.

But, as we have indicated, the territorial exchanges were by no means wholly disadvantageous. While Poland relinquished more territory than she received in return, the territory given up was mostly a backward rural area, large parts of it unreclaimed marsh or forest. By contrast, the territory she got had long been the scene of modern, fertilizer-intensive farming.* Further, the acquired territories had been the loci of substantial investment in industrial facilities, and it appears that the postwar settlements gained for Poland far more industrial plant than they took from her. In fact, Poland may have begun the postwar period having more industrial capital within her new boundaries than had existed within the old boundaries in 1938. Certainly Polish government data indicate that.** Considering that the population had been reduced by territorial transfers as well as by wartime attrition, and was consequently 30 percent smaller than that of the prewar nation, per capita wealth was substantially higher than it had been--little changed in terms of housing, but very much higher where industrial capital was concerned.

Thus, while the Poles surely suffered great losses in every important dimension, as a nation they were in a position to offset these losses to some degree through material acquisitions from their neighbors.

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*UNRRA, op. cit., p. 3.

**Cf. UNRRA, Industrial Rehabilitation in Poland (Revised), Operational Analysis Papers, No. 35, London, April 1947, pp. 1-13. These pages set forth various data supplied by the Polish government, in particular estimates of wartime capital wastage and of the subsequent recovery therefrom. We have been unwilling to give those data prominence because they are unsatisfactory in certain respects. (For example, in the form available to us they reflect no clear and consistent distinction between capital that had been rendered unusable pending repairs and capital that had been destroyed totally.)

World War II Losses in Eastern Europe: The USSR

The Soviet Union also suffered heavy losses during the course of World War II. In view of Poland's experience, we may as well raise at once the question of whether the USSR somehow shifted any substantial part of these losses to her neighbors. Certainly the Soviets achieved aggrandizing boundary adjustments between 1939 and 1945. However, those adjustments, while far from trivial in the aggregate, nevertheless involved a proportionate change that seems small when compared with what happened in Poland's case. Moreover, there is nothing to indicate that the territories taken over differed sufficiently in character from neighboring parts of the Soviet Union so that they would have much effect on nationwide per capita indices--e.g., on per capita Soviet wealth, or on its dwelling space component. It appears that the Soviets bore most of the burden themselves.

And the burden was large. World War II produced about 25 million excess deaths in the USSR--12 percent or 13 percent of the prewar population.* At one time or another during the war, Axis troops occupied areas on which a total of some 40 percent of the Soviet population had lived.** What resulted is suggested by a report from an UNRRA mission after it had visited six Ukrainian cities in May, 1946:

> The pattern is fairly uniform. Many plants were completely destroyed and those which still stood were usually heavily damaged and almost universally gutted of all modern equipment. ... We observed many instances of ingenious adaptation and salvaging of old and antiquated machinery; yet restoration was everywhere slow and complicated by lack

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*Cf. "Demographic Trends and Population Policy in the Soviet Union," by James W. Brackett, in Dimensions of Soviet Economic Power, published in Hearings, Joint Economic Committee, Congress of the United States, 87th Congress, second session, December 1962. Pages 509 and 510 are particularly pertinent.

**Cf. Columbia Lippincott Gazetteer of the World, Leon E. Seltzer, (ed.), 1952, p. 1982.

The particular oblasts which were overrun can be identified by reference to Hanunian, Norman, Guide to Soviet Population and Industry (U) (short title), The RAND Corporation, RM-3350-PR, September 1962 (Secret). Cf. Figs. 3 and 5 and Table 2.

> of equipment to move away the rubble, transport the materials, produce the electric energy, and repair the streets, sewers, and gas and electric lines.*

A month earlier, when members of the UNRRA mission to the Ukraine had first visited Kremenchug, they reported the city 90 percent destroyed, and added:

> About 50,000 inhabitants [of the normal 90,000] have returned and are living in dugouts, cellars, and rubble shacks. Reconstruction is progressing slowly because of a shortage of materials. The only industries operating are a small machine shop for bridge repair parts, a textile factory, and one wing of a cigarette factory [!] which happened to escape destruction. One bakery is being repaired. ... All grain elevators and flour mills, which constituted the chief prewar industry, are completely destroyed.**
>
> . . .
>
> Kremenchug formerly had a good 450-bed general hospital, which [had been] blown up. ... All equipment ... was demolished. The only buildings which escaped destruction were seven small sheds and storage houses on the outskirts of the hospital grounds. The hospital staff recently installed 250 beds in these ramshackle buildings. In a number of wards the windows were bricked up because no glass is available, and the only light came from an unshaded 40-watt bulb in the corridor. ... most of the roofs leaked; there were no indoor toilets; fuel was available to heat only the operating and delivery rooms and the nursery. ... Some of the beds had been salvaged from the ruins of the old hospital, and consequently were badly twisted and charred.***

In reporting these particular observations by UNRRA field observers, our source comments, "The same general conditions prevailed in most of the hospitals visited."****

Exceptionally poor harvests complicated the situation. Food rations dwindled to a level where work efficiency was lowered and health affected adversely:

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*Quoted in UNRRA, Economic Rehabilitation in the Ukraine, Operational Analysis Papers, No. 39, London, pp. 38, 39.

**Ibid., p. 11.

***Ibid., pp. 64, 65.

****Ibid., p. 65.

> The effects of poor diet are already to be seen. The people generally show a noticeable lack of their former liveliness, energy, and cheerfulness. Moreover, according to the Medical Officer of the UNRRA Mission to the Ukraine, clinical starvation has made its appearance in the smaller villages of the Republic: protein dropsy and avitaminosis are increasing; and among the townspeople there is great incidence of skin infections and respiratory and naso-pharyngeal conditions.*

We cannot know how faithfully such assemblages of eyewitness accounts mirror the circumstances of the time. There are no definitive tests that we can apply. Apparently Soviet tactics effectively prevented the score or so of observers (mostly American) with which UNRRA staffed its missions in the USSR from freely choosing the times and places at which to make observations. Granted visas only belatedly, greeted with reserve or outright suspicion, and permitted to travel into the countryside only sporadically and under escort, UNRRA staffers must have had little opportunity to ascertain the senses in which what they saw was representative.**

Be that as it may, their reports seem reasonably consistent with the picture of war's consequences put forth in 1947 by Nikolai Voznesensky, then Deputy Premier of the USSR.*** Voznesensky asserted that the invading forces "destroyed or ruined" nearly half of all dwellings in whatever cities they occupied, and about 30 percent of all rural dwellings in the overrun territory.**** If we accept these figures and assume that housing in the two categories is distributed over the USSR pretty much in proportion to people, it follows that about 13 percent of all Soviet houses were "destroyed or ruined." Voznesensky's categorization is, of course, quite ambiguous, and he provides us with no basis for ascertaining how often the damage referred

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*Ibid., p. 76.

**Cf. Woodbridge, op. cit., pp. 238-256, esp. 238-243.

***Voznesensky, Nikolai A., The Economy of the USSR During World War II (English translation published by Public Affairs Press, Washington, D.C., 1948). Cf. esp. pp. 30-34, 85-90.

****Ibid., p. 87.

to was severe enough to equate with total destruction. Surely the 13 percent figure ought to be discounted somewhat if this latter meaning is what interests us.*

The former Deputy Premier also provided estimates of Soviet losses in more comprehensive terms. He said that wartime destruction and looting of property in the occupied territory of the USSR cost her two-thirds of all the reproducible wealth located there.** Since the occupied territory probably contained close to 40 percent of the total amount of such wealth in the whole USSR,*** the implication is clear: World War II must have cost the Soviet Union about 27 percent of her reproducible wealth.

We have, of course, no adequate basis for assessing the reliability of Voznesensky's estimates either. Considering the difficult circumstances under which they were made, it is remarkable that the 27 percent figure (which they have always implied) has stood the test of time as well as it has. The factor-of-two disparity between losses of housing (13 percent) and reproducible wealth in general (27 percent) is a little surprising, but the two estimates are not altogether irreconcilable.****

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*Readers interested in pursuing the matter might consult Housing in the USSR (U), (CIA/RR92), CIA, Office of Research and Reports, 1957 (Confidential), esp. pp. 7, 16, 17, and 55.

**Voznesensky, op. cit., p. 87.

***As we have already noted, that part of the entire USSR which was overrun had accounted for 40 percent or 45 percent of her population. It had also accounted for about one-third of her Gross Industrial Product. (See Voznesensky, op. cit., p. 85; compare Hanunian, loc. cit.)

It is to be expected that elements of Soviet national wealth would be distributed geographically in much the same pattern as population, but biased toward that of industry. Hence the 40 percent figure, which is intermediate between the figures cited.

****As one Soviet specialist (Richard Moorsteen, economist at The RAND Corporation) points out, the two estimates are not directly comparable, the housing figure relating to physical units, the other to value. If we adjust for that, and assume the 27 percent figure to reflect higher loss rates on circulating capital (inventories and the like) than on fixed capital, it can be shown that the loss rates for housing structures may have been quite similar to those for other kinds of structures, at least in occupied cities. And this is all that is required in order that we feel comfortable with the estimates under discussion.

And, reassuringly, a recent investigation has revealed that consistency with Soviet capital stock data for 1940 and 1950 requires wartime losses of the fixed capital component of national wealth to have amounted to about 25 percent of the total.* Allowing for a substantially higher loss rate for variable capital, the rate applicable to reproducible wealth as a whole would exceed 25 percent; 27 percent seems not an unreasonable value.

And so we find that the USSR suffered major losses in terms of such principal indices as population, housing, and reproducible capital in general. The amount of disruption caused by these losses and by the fact that so much of the nation was overrun must have been enormous. Yet recovery was rapid. The population reached its prewar level (on comparable territory) by 1955. By that time the housing situation had improved sufficiently so that even in cities, where housing damage had been especially heavy, the absolute amount of living space was up 70 percent from the prewar value (and up about 16 percent on a per capita basis).** The prewar amount of fixed capital had been reattained by 1950,*** and the 1940 level of industrial production slightly earlier.****

Other Large-scale Disasters

With this we conclude our sketches of catastrophes that we judge to be particularly relevant to our topic. There were other contenders for our attention, notably the Russian debacle circa 1917, and Germany's collapse as a result of World War II. But these had already been

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*The "recent investigation" to which reference is made was by Richard Moorsteen and Raymond P. Powell, and is reported in a forthcoming book, The Soviet Capital Stock 1928-1962. Section 6 of Chap. II contains the relevant discussion.

**Sosnovy, Timothy, The Soviet Housing Situation Today, Soviet Studies, Vol. XI, No. 1, July 1959, p. 4.

***Cf. Moorsteen and Powell, loc. cit.

****Nutter, Warren G., The Structure and Growth of Soviet Industry, in Comparisons of the United States and Soviet Economies, Joint Economic Committee, Congress of the United States, September 1959.

described and analyzed at some length, and from a point of view akin to ours, in Disaster and Recovery: A Historical Survey.*

Our purpose, as we have said, has been to develop a perspective against which to view the amount of destruction, but we have also wanted to develop one that will serve when we come to consider the sorts of imbalances, or disparities, that nuclear attacks might produce. In this latter connection, we wanted especially to take note of disasters that involved survival disparities of varied sorts. Those just reviewed meet this second objective along with the first. We shall return to the disparities involved later.

We shift our attention, now, from catastrophes that have actually been experienced to some purely hypothetical ones of the kind that nuclear war might produce. The similarities and contrasts are of some interest.

OUR COMPUTED RESULTS

Proportion of Nation's People Expected To Survive

For introductory purposes the magnitudes of the disasters implied by our hypothetical nuclear attacks can perhaps best be conveyed in terms of a single dimension. We shall eventually discuss each of 28 dimensions (i.e., populations) for which attack outcomes have been calculated with our apparatus. But to begin with we limit our exposition to the one most frequently discussed in other studies: the number--or, alternatively, the proportion--of people surviving.

Since even the brief sketches that we have just presented of historic catastrophes provide much richer detail than this, readers may feel uncomfortable with the change. Some may even suspect that description in only one dimension is utterly unsuitable for such a complex subject, and hence bound to be unfruitful. (It is, indeed, a little like restricting a description of apple pie to specifics about what fraction of the apple is used.) There are some advantages to

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*Hirshleifer, op. cit.

beginning this way, however. Doing so will make it possible to appraise the influences of some important variables before these are obscured by clutter. And, after all, in this report the limitation will be temporary.

The alternative attacks that we have devised for the purposes of this study differ a great deal both in weight and in implicit objective. Accordingly, they produce widely differing damage patterns and survival rates. The number of targets struck varies from 30 to well over 1000. Weapon yields are mostly in the megaton range--sometimes as much as 100 megatons (MT). The assignment of weapons to targets is such as to involve delivery of some 800 MT by the lightest attack considered and 13,200 MT by the heaviest. Taking account of fallout as well as of prompt effects (blast, and thermal and prompt ionizing radiations), indications are that the least lethal of our hypothetical attacks would kill about 3 percent of all people within the 48 conterminous states,* while the most lethal one we have considered would kill about 60 percent.

The outcomes of all eight attack alternatives are displayed in Fig. 1--where, however, it is the percentages <u>surviving</u> (not killed) that have been recorded. We would expect such an array of outcomes to reveal a strong dependence on attack weight. It does. Note that the bars have been arranged in order of the megatonnage delivered. The lightest attacks, represented by the three bars on the left, result in relatively high survival rates, while the heaviest attack, represented by the bar at the extreme right, results in the lowest survival.

The procession of bars would descend monotonically from left to right were it not for two attacks--those labeled 1-3 and 1-30. The anomalous behavior here is due to a peculiarity of the (common) target system against which these two alternative attacks are directed. It (target system 1, as we denote it) includes a large number of missile silos; and a major part of the megatonnage is assigned to these silos.** Because such installations have typically been sited well away from

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*For various reasons, damage in Alaska and Hawaii was not estimated. The validity of the conclusions we shall reach is not affected thereby.

**A detailed accounting of attack specifications will be found in Sec. III.

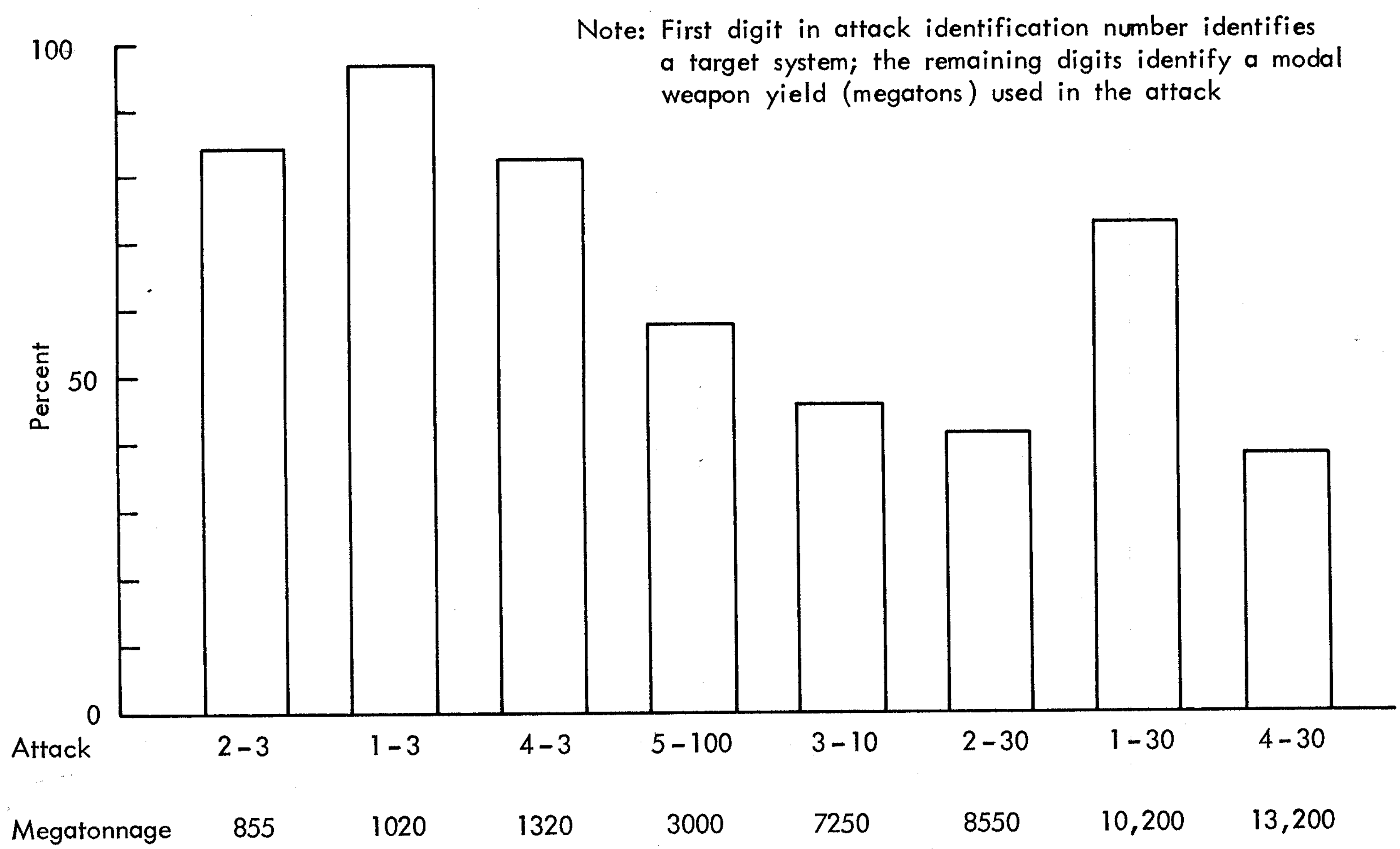

Fig.1—Percent of U.S. people surviving eight alternative attacks

densely populated areas, attacks against them expose relatively few people to intense hazards.

It is interesting to note a related consequence of this remoteness. Increasing the megatonnage delivered by a factor of 10--from 1020 MT for attack 1-3 to 10,200 MT for attack 1-30--alters the percentage of people surviving substantially, but by only about half as much as when similar changes in attack weight are made against other systems. (In the case of target system 1, survival falls from 97 percent to 73 percent--i.e., by 24 percentage points. In the cases of target systems 2 and 4, increasing the attack's weight by a factor of 10 results in survival rates lower by 42 and 44 percentage points respectively.) The reason is not that target system 1 involves a relatively small proportionate increase in the number of people subjected to hazards. Quite the reverse is true: with its weapon yields increased, the attack's hazards extend into somewhat less sparsely inhabited areas than before, and fatalities consequently jump upward sharply. But, jumping upward from such a very small base, they have so far to go that the great majority of the population is not vitally affected even by the factor-of-ten increase to 10,200 MT.

There is clearly a moral to be drawn here with respect to the siting of any military installations which are deemed likely to draw attack. Such installations should be located as far as is practicable from areas where population densities are high. Not that spillover from attacks on military installations can thereby be made entirely innocuous. There will always be some residents within reach of weapon effects--at least of fallout. As General LeMay once phrased it when testifying before Congress on just this aspect of the siting problem, "You are upwind or downwind from somewhere wherever you go."* But this does not deny the utility of siting such installations outside densely populated regions and well away from sizeable urban agglomerations. The relatively high survival that, as Fig. 1 shows, results when most of the targeted facilities are so located, and the indicated persistence of this

*Hearings, Military Operations Subcommittee, Committee on Government Operations, House of Representatives, 1960, p. 150.

relationship over a large range of attack weights, jointly underscore the importance of planning to that end.*

Of course, except for missile launch facilities and a modest number of other installations, the locations of military bases were typically established long ago--mostly prior to the nuclear era, or at least before the significance of fallout was widely appreciated. This is the reason that attacks on target systems 2 and 3 produce higher fatality rates at comparable megatonnages. Attacks 2-3 and 2-30 are, respectively, light and heavy strikes primarily directed against the Strategic Air Command's bomber capability, including its command and control net and certain ancillary facilities. A number of naval installations are also assumed to be targeted. However, these attacks leave missile silos entirely untargeted. The lighter of the two attacks is consistent with 84 percent survival; the heavier one with only 42 percent.

Target system 3, against which attack 3-10 is directed, is composed of a great variety of target types, any of which might have substantial military significance in the short run. It includes not only all the target categories so far mentioned (with the single exception of Minuteman silos), but also significant numbers of such facilities as seaports, air defense installations, troop concentrations, military air transport bases, and petroleum refineries. Since many of the additional targets are in or near urban areas, the attack's 725 10-MT weapons produce a high fatality rate. Figure 1 shows only 46 percent of the nation's people surviving.

Target system 4, subjected alternatively to light and heavy attacks, is in large part identical to target system 1. It differs only in that a central aiming point has been added in each of the 30 most populous urbanized areas. Attacks 4-3 and 4-30 are similar to 1-3 and 1-30, respectively, except for the 30 additional weapons

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*This finding, here based upon a sophisticated calculus, confirms results previously obtained using a crude damage assessment procedure.

Cf. Hanunian, Norman, testimony at the 1961 Civil Defense Hearings before a Subcommittee of the Committee on Government Operations, House of Representatives, 87th Congress, first session. Pages 226 to 233 are particularly pertinent.

directed at urban centers. In attack 4-3 these are 10-MT weapons; in 4-30 they are 100-MT weapons. The resulting survival, overall, is 83 percent for the former, 39 percent for the latter.

While these survival values can be compared with those for attacks 1-30 and 4-30 by reference to Fig. 1, the comparison will be facilitated by a small table:

CHANGES IN SURVIVAL RATES
WHEN ADDING 30 URBAN CENTER AIMING POINTS
TO ALTERNATIVE LOW-COLLOCATION ATTACKS

	Attack	Survival Rate	Difference
Light	1-3	97%	14
	4-3	83%	
Heavy	1-30	73%	34
	4-30	39%	

This table makes two points immediately clear. As one would expect, the addition of 30 urban center aiming points results in a distinctly lower survival rate, whether cities are struck within the context of a light attack or a heavy one. But (and this is the second point) it makes vastly more difference in the latter context. The explanation is simple in essence. The (single) weapons assigned to urban centers in the light attack are not large enough--even at 10 MT--for each to cover an entire urban agglomeration with lethal effects.[*] Blast and thermal energies fall off too rapidly with distance, and the target

[*]The 30 largest urbanized areas account for half of the U.S. urban population and cover 450 square miles, on the average. The three largest average 1400 square miles apiece. (Cf. Table 4, County and City Data Book, 1962, U.S. Department of Commerce, Bureau of the Census.)

areas may be spared fallout almost entirely if wind velocities are high. A weapon of moderate yield does produce a great many fatalities, but this is because urban population densities are so high, not because the entire urban population is blanketed by its effects.

Our fifth target system remains to be introduced. It consists of only 30 elements--the same 30 urbanized areas identified in connection with target system 4. Attack 5-100 delivers a single 100-MT weapon against the center of each of those areas. Despite the small number of weapons involved, such an attack is, of course, devastating. Only 58 percent of the nation's population survives.

A Digression on Attack Overlaps

Our eight attacks were devised to reveal the kinds and magnitudes of survival disparities to which nuclear war might give rise. Having been so designed, they cover, as we have seen, a substantial spread of target system types and attack weights. It is pertinent to discover what we can about the extent to which these attacks result in distinctive patterns of destruction. The data already presented provide us with one indication.

We have previously remarked that our first target system (1) is a rather distinctive one, its elements consisting predominantly of missile launch facilities, which are characteristically located far from major urban concentrations. Target system 5 is at the other extreme, consisting as it does only of major urban agglomerations. We would expect to find the overlap in damage as between these two attacks to be smaller than the overlap between any other two of our attacks. That is, we should expect the attack oriented primarily toward remote missile launch facilities to affect vitally an essentially different group of people from the city-oriented attack, while other pairs of our attacks should involve much more overlap.

Looking back, it is apparent that target system 4 is simply the two extreme target sets combined. If, then, fatalities from attacks on target systems 1 and 5 sum to the same number as those resulting when similar weapon assignments are made against target system 4, the

implication is that overlap is zero--that none of the individuals vulnerable to attacks on target system 1 is also vulnerable to attacks on target system 5. But if this summing procedure results in a larger number, it is because of double counting--counting a person as killed when he is exposed to lethal effects of attack 1-30, and counting him once again as killed if he is similarly exposed in attack 5-100. The amount of double counting is what interests us here, for this is what will provide us with the insight we are seeking.

The table below displays pertinent values (derived from Fig. 1).

FATALITIES FROM THREE RELATED ATTACKS

Attack	Fatality Rate
1-30	26.6%
5-100	41.6
Sum of above	68.2
4-30	61.1

What we find is that overlap is indeed low, but certainly not zero. Subtracting 61.1 from 68.2, we see that double counting was involved with respect to 7.1 percent of the nation's population. So attack 1-30, though directed entirely at installations vital to strategic military operations (and predominantly at such isolated installations as Minuteman silos), nevertheless spills over to a nontrivial degree onto the general population. More particularly, it kills some of the same people as the city-oriented attack; about one-sixth of the people who would be killed if one 100-MT weapon were delivered to each of the 30 ranking urbanized areas would alternatively be killed by the heavier of our two "low-collocation" attacks.

Such overlap would, of course, vitally affect a very much smaller proportion of the nation's population if smaller weapon yields were involved. We have not pursued our calculations far enough to make a direct estimate. It is pertinent, though, to recall that attack 1-3--using yields one-tenth as large against the same "low-collocation" target system--produced a <u>total</u> fatality rate of 3 percent. We may

conjecture that only some small fraction of the 3 percent would be vulnerable to an urbanized area attack as well. That is, with the lower weapon yields, we should expect not only that far fewer people would be killed, but that only a minuscule proportion of the nation's people would need to dread the two kinds of attack equally.

One further observation: A point deserving special emphasis, in view of the purposes of this study, is that overlapping damage has now been revealed as a factor which, though minor in the limiting case explored, is one to be reckoned with in general. Such overlap limits the extent to which a damage pattern resulting from one attack can differ from that resulting from another. This encourages us to believe that the disparities revealed by our attacks are passably representative of real-world extremes, insofar as disparities may derive from attack design at all. For the object of producing distinctive patterns of collateral damage was a prime consideration influencing the design of our attacks, while attacks constructed in deadly earnest would emphasize other considerations.

Winds and Consequent Deviation from Expectation

The results we have thus far been discussing have been expectations with respect to both prompt effects and fallout. With weapons that are numerous and large, the total number of people killed by prompt effects is not very sensitive to the small deflections about each aiming point that seem appropriate to an analysis like this.*
Fallout fatalities, on the other hand, are quite variable, depending upon the directions and velocities of the winds involved. Variability due to wind differences is conspicuous even in some of our results relating to the broadest national aggregates, and, as we shall see later, it tends to assume larger proportions as we disaggregate.

Figure 2 suggests how much difference wind variations might make to survival of the nation's people considered as a whole. It displays, for each of our eight attacks, the highest and lowest survival rates that resulted when calculations were repeated for a number of

*A CEP of one mile has been assumed. Section III describes this and other modeling aspects of our study.

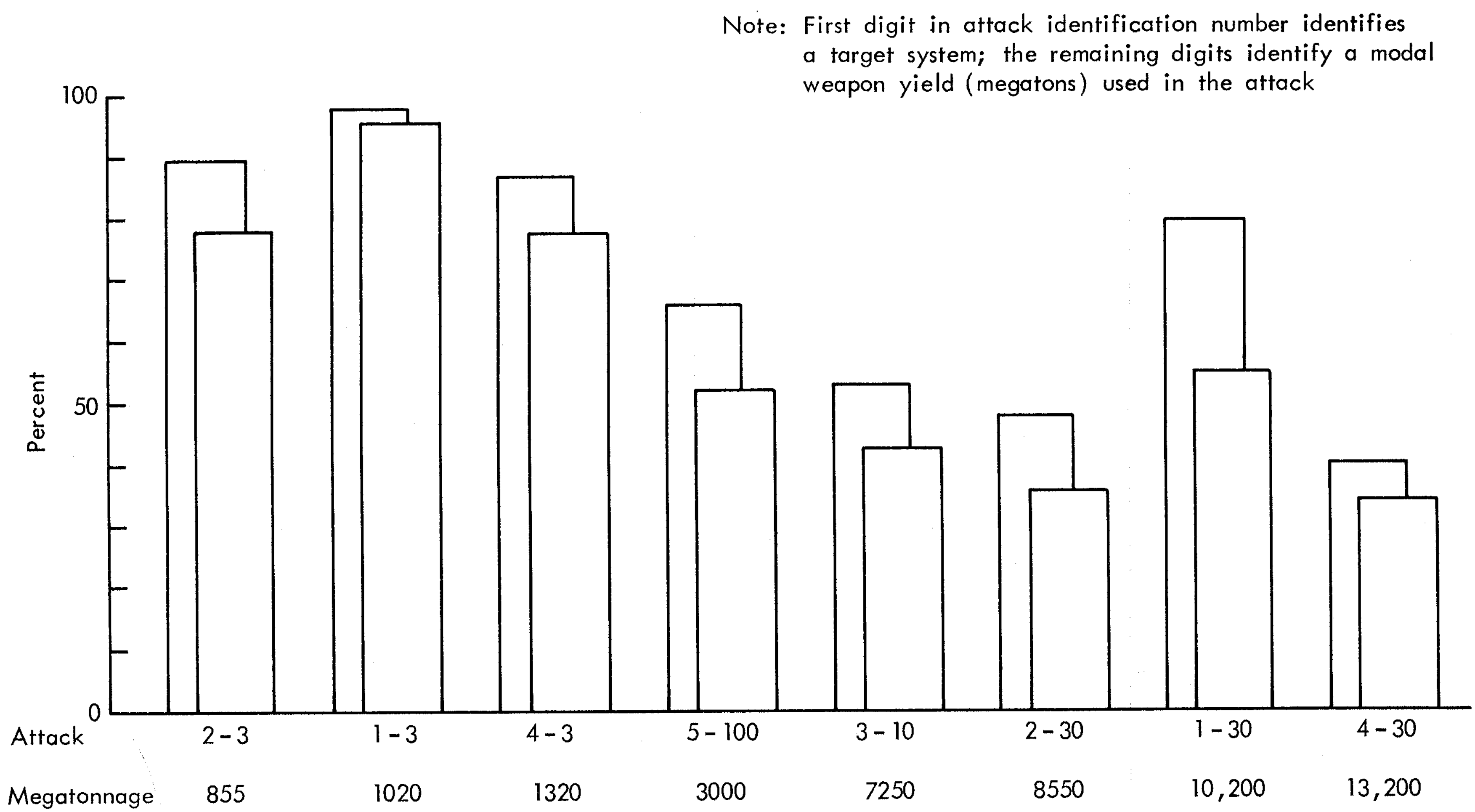

Fig. 2—Maximum and minimum survival percentages for U.S. people in consequence of assumed wind variations (eight alternative attacks)

alternative wind conditions.* The differences between maxima and minima fall mostly between 9 and 14 percentage points, though differences as low as 2 points and as high as 25 are to be found. To translate these latter figures into somewhat more vivid terms, what we have found is that the lives of at least 4 million, and perhaps as many as 50 million, people are at the mercy of the winds in one or another of our attacks.

Regional Variations in Survival

The proportion of the population-at-large that we calculate would survive varies markedly from region to region. The Southeast tends to fare somewhat better, and the Pacific Northwest much better, than the nation taken as a whole. The other two corners of the country, the Northeast and California, come off rather badly, especially the latter. There is, of course, some dependence on attack design, and exceptions could be pointed out. But the statements just made seem to be rather more generally correct than one might expect--not only with reference to the attacks we are analyzing here, but to others as well.**

If we compare results averaged over all attacks and all wind conditions, we find the survival rate in the Northeast to be a little less than 80 percent of that in the abutting Southeast. Similarly, the survival rate in California averages only 64 percent of that in the Pacific Northwest. Such averaging, of course, obscures the differences encountered in particular cases, and these can be quite striking.

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*Only a handful of wind patterns served as basis for the calculations, so the true extremes possible are doubtless somewhat farther apart than those shown. However, the handful were selected purposefully rather than randomly (see Sec. III), and because of this may conceivably represent the range of possibilities passably well.

**Dr. Joseph Coker, head of the National Resource Evaluation Center, has remarked that his agency's calculations show California and the Northeast tending to suffer relatively high loss rates. Cf., Demographic Facets of Nuclear Warfare, paper delivered to Population Association of America, Madison, Wisconsin, May 1962, by J. D. Coker.

For example, if one of our light attacks (2-3) were delivered when wind conditions were similar to those of June 15, 1951, about 87 percent of the populace in the Pacific Northwest would survive, but only 36 percent in California. That is, Californians would experience a survival rate only about 40 percent as high as did people in Washington and Oregon. The same case would produce a somewhat smaller disparity in the East: the survival rate in the Northeast would be 73 percent of that in the Southeast. Note that, insofar as our lightweight attacks are concerned, the results just cited represent an extreme. They are not typical of results for such attacks. Viewed in ratio terms,* survival disparities have little chance of looming large so long as the attacks dealt with kill only small fractions of the total population.**

Our heavier attacks are far more devastating, and one consequence is that large interregional survival disparities are a commonplace. The region that fares worst typically experiences a survival rate less than half that of the region faring best, and a rate only one-third that of the region faring best is not entirely rare. The most extreme cases are occasioned by attack 4-30 (which, it will be recalled, is our heaviest). Let us examine the particular instance in which the strike is assumed to come when wind conditions are like those of Christmas Day, 1951.

In that instance, the survival rate for the nation as a whole was computed to be 40 percent. The associated regional variations are extraordinary, ranging from a low of less than 7 percent to a high of 75 percent--a factor-of-ten spread.*** The survival rate for each of eight regions is charted in Fig. 3. Notice that it is the populous, industrialized Northeast which is almost completely depopulated, and that the abutting Southeast experiences a 65 percent survival rate.

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*As is most appropriate to the purposes of this study.

**We hope this use of the phrase "only small fractions" will not lead anyone to attribute an unintended judgment to us. Fractions such as 1/10 or 1/4 are only small members of the set of all fractions, however appalled one may be at the thought of fatality rates that large.

***Winds like those of December 15, 1951 yield a similar range.

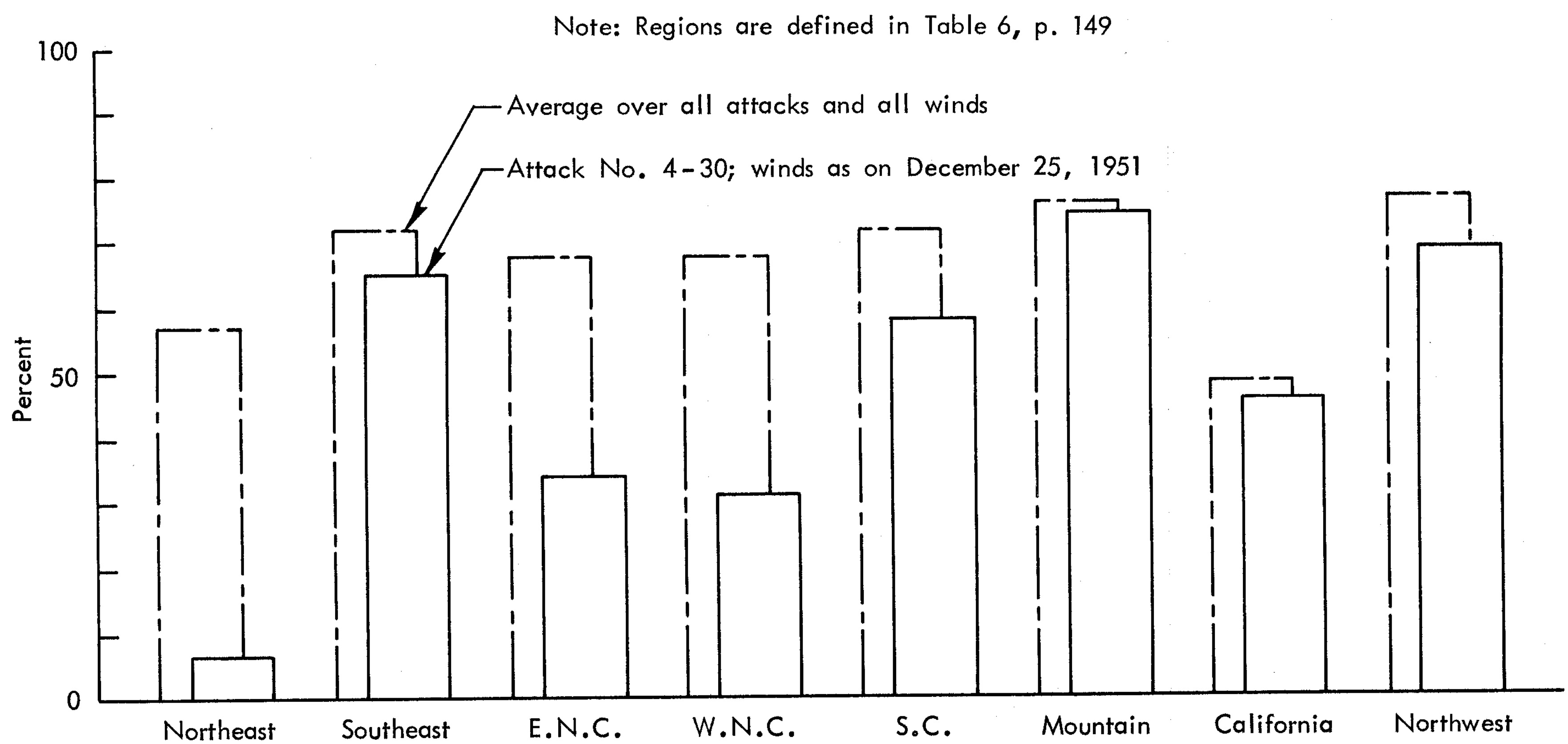

Fig. 3—Average survival by regions, and survival for one of the cases averaged

Notice, too, that Californians (as is typical in this analysis) fare badly in comparison with the people of bordering regions, although in this instance (as is not at all typical) somewhat better than the average U.S. resident.

Digression on the Value of Looking Behind the Averages

It is often said that while there are contexts in which we can justifiably content ourselves with examining averages, there are others in which reliance on averages can be seriously misleading. We should recognize what we have just seen as an indication that contingency planning for a postattack world ought not depend on an appreciation of the nature of such a world garnered entirely from averages. Surely preparations for such a contingency would differ in important respects depending on whether survival rates were apt to be pretty much the same in one region as in another, or were apt to be utterly different.

We have noted that if the values with which we elect to work are averages over all the attacks and wind conditions in our repertoire, a survival rate in one region can be as little as 64 percent of that in another (p. 29, above). That, however, is an extreme instance, involving the region with the lowest survival rate relative to the one with the highest. As can be sensed from comparison of the left-hand bars in Fig. 3, a value more typical of our results would be near 85 percent.* More than seven-tenths of all such values lie between 79 percent and 100 percent (taking the lower versus the higher), as do more than nine-tenths if we omit values involving California.

Thus, after inspecting the relationship between expected survival in each region with that in each other region, we might very well come away with the impression that differences among regions are typically modest. Yet, from the look we have already had behind the averages, we know the truth to be very different.

Where inspection of average values would lead us to believe that the survival rate in one region never differs from that in another by

*We compute the mean of such values from our results to be 85 percent. The mode is distinctly higher.

more than a factor of about one and one-half, a look at the particular cases on which those averages are based has revealed not only that larger factors are to be found, but that such factors are fairly frequent.

Certainly this is true where our five heaviest attacks are concerned. Over four-tenths of the interregional disparities produced by these attacks amount to factors of one and one-half or more. One out of four of the disparities equals or exceeds a factor of two; factors of three or more are found in 4 percent of such instances; and, as mentioned earlier, a factor of ten is not unknown.

The only impression produced by inspection of overall average results that has been corroborated by examination of outcomes in particular cases is that certain regions, notably California and the Northeast, but also the East North Central states, are particularly prone to suffer relative to other regions.

Thus, with this one qualification, we have exposed a connection in which the expected (i.e., average) outcome is all too likely not to be the one that occurs. We leave the reader to consider whether any contingency planning in which he has a stake is on this account apt to be misdirected.

Differences Between Urban and Farm Survival

Perhaps the most prominent disparities among the many in our computed results are those between survival rates for farm populations on the one hand and urban populations on the other.* That these particular disparities should exist is natural enough. That they should ordinarily favor survival of farm populations relative to urban ones is also to be expected. After all, most sorts of strategic targets are associated with cities; only in recent years has there been any insistence on avoiding the collocation of militarily important installations with urban populations.

Nothing about the statements just made would trouble anyone, were it not for the concern, expressed in several quarters, that it is the possible postattack states of the farm sector that constitute the

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*Populations are as defined in Table 2 of the County and City Data Book, 1962, U.S. Department of Commerce, Bureau of the Census.

greatest threat to national viability.* Actually, however, those who are pessimistic about the ability of the farm sector to recuperate from a nuclear attack base their judgment only in small part on considerations of direct damage; such persons are troubled more by imponderables, including conceivable climatic and ecological changes detrimental to farming, and by presumptions that certain inputs on which modern farming techniques depend for high productivity (viz., petroleum and pesticides) would no longer be available in suitable quantities.

It is beyond the intended scope of this report to consider whether the imponderables usually cited are justifiably a concern with respect to agriculture's postattack potential.** But we <u>can</u> throw some light on the extent to which agricultural populations might survive--and particularly on how well agricultural populations would survive relative to other populations. We may even be able to make some useful observations about whether it should be expected that recovery in the large would be prevented by agriculture's prostration.

The latter we defer until a later section (see Sec. V). Here we can conveniently address questions relating mainly to the size of urban-farm survival disparities, and to their dependence on such important variables as attack weight and type, fallout-bearing winds, and differential shelter.

Figure 4 provides us with a basis for discussing these aspects. It shows, separately, the percentages of farm and urban people that might survive each of our eight attacks. The bar-top caps define the range over which survival values were found to vary in response to changes in the wind conditions for which computations were being made. (As

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*Cf. Winter, Sidney G., Jr., <u>Economic Viability After Thermonuclear War: The Limits of Feasible Production</u>, The RAND Corporation, RM-3436-PR, September 1963, especially pp. 121, 140, and 157. Also Stonier, Tom, <u>Nuclear Disaster</u>, Meridian Books, 1963, pp. 78-84 and passim.

**That certain imponderables are not likely to present any insurmountable difficulties seems to be a common theme of two recent reports. Cf. Blumenfeld, S. N., <u>Nuclear War and Soil Microflora</u>, The RAND Corporation, RM-4827-TAB, August 1966; and H. H. Mitchell, M.D., <u>Floods and the "Postattack Biology Problem": A Preliminary Survey</u>, The RAND Corporation, RM-4238-TAB, January 1965.

Whether mechanisms exist by which nuclear attacks could modify climate to an important degree is not known. Cf. Batten, E. S., <u>The Effects of Nuclear War on the Weather and Climate</u>, The RAND Corporation, RM-4989-TAB, August 1966.

Note: First digit in attack identification number identifies a target system; the remaining digits identify a modal weapon yield (megatons) used in the attack

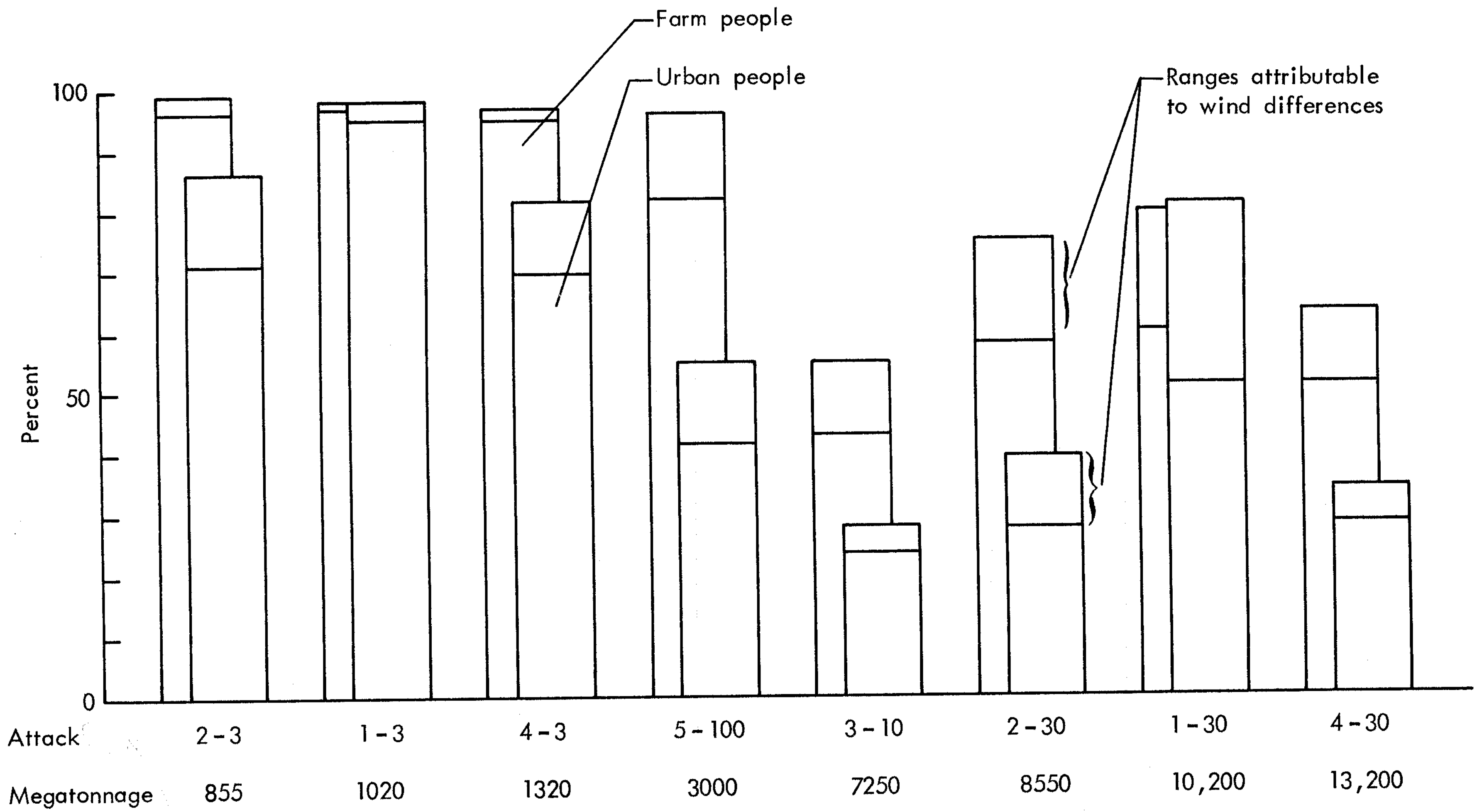

Fig.4—Percent of U.S. farm and urban people surviving eight alternative attacks, assuming uniform shelter

mentioned in another connection, we have by no means dealt exhaustively with possible wind conditions; accordingly, it must be assumed that Fig. 4 understates the amount by which winds could affect results.) Implicit in the data charted are, inescapably, assumptions about civil defenses. We assume shelter to be that afforded by structures presently in existence, and that urban and farm people benefit equally from it. (The latter assumption will be modified shortly.)

By and large, the survival rate shown for farm people is higher than that for urban people--distinctly higher for two of the three light attacks, and very much higher for all but one of the heavy attacks. The exceptions are occasioned by strikes against target system 1 (in which a major part of the megatonnage is delivered to missile launch facilities and other targets remote from cities). Even here, however, what we see is not a strong reversal; rather, it is hardly more than an evening-up. Wind-by-wind ratios of the farm survival rate to the urban survival rate range between 1.00 and 1.03 for the lighter attack (1-3), and between 0.90 and 1.16 for the heavier one (1-30.*

Considering now <u>all</u> the combinations of attacks and winds for which calculations have been made, such ratios exceed 1.5 almost half the time, and exceed 2.0 close to one-tenth of the time. The lighter attacks discriminate less strongly against urban residents than do the heavier ones, the mean ratio of farm-to-urban survival rates being 1.17 for the former and 1.70 for the latter.

The assumption, mentioned earlier, that urban and farm people benefit equally from shelter--i.e., find weapon effects being attenuated to the same degree--importantly influences the ratios just quoted. Since that assumption was made more for convenience than because of any assured correspondence to reality, we are obliged to examine it here.

Delivery of the attacks we have designed might, of course, occur at any time in the future. How much new shelter might actually become

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*The extreme survival rates experienced by one population do not necessarily occur under the same wind conditions as the extremes for the other population. Thus, the highest survival rate for the urban population is 81 percent, and occurs in the same circumstances as a 73 percent survival rate for the farm population.

available, respectively, to the farm and urban components of the population prior to attack time, how good that shelter might be, how well each component might learn to use it, and how much opportunity there might be for movement to distant shelters--all these are moot matters. We know only that farm people have inferior access to high-protection-factor (P.F.) shelters. Most high-P.F. shelters that are within practicable reach of any appreciable fraction of the farm population are in cities. Thus with respect to any attack occurring in the immediate future, our assumption of equal benefit is tantamount to assuming that sizeable numbers of farm people receive sufficient warning of impending attack so that (1) utilizing farm equipment, they can improvise suitable shelter, or so that (2) they can drive to the smaller (hopefully untargeted) cities nearby and there compete on more or less equal terms with city residents for whatever high-quality shelter is available. Some combination of these two procedures is not obviously impossible, but we are reluctant to make our results wholly dependent on such an assumption.*

Therefore, we need to consider how the urban-rural disparities discussed in connection with Fig. 4 would be altered if farm people had to rely on rural-area shelters. Making the best judgment we could of farm and urban shelters and of prospects for their continued ability to function after absorbing any prompt effects, we have concluded that a defensible factor by which to reduce farm survival relative to urban survival is about 20 percent.**

The upshot, then, is that under these alternative--and, for the present, probably more realistic--civil defense assumptions, the disparity favoring survival of farm people is in general reduced to a comparatively modest level. Where it was large in the earlier case,

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*Farm people alone would not swamp the shelters--nationwide, urban people outnumber farm people nine to one--but many cities don't have enough high-P.F. shelters for their residents as it is.

**This estimate is based on calculations, for alternative attacks, with respect to the farm and urban labor forces, with farm shelter reflecting both assumptions alternatively. Since results for these labor force components are known to be highly correlated with the corresponding total populations, we are convinced that 20 percent is a satisfactory estimate.

it is still substantial. Where it was small, the advantage has disappeared or been reversed. The shift is summarized in the accompanying table. Under either assumption, the tendency is for a disparity to exist and to favor survival of farm people. But, in the light attacks--where the tendency was weak before--we now see a modest reversal. Subject to that qualification, the conclusion we can now state is that farm people have a better chance for survival than urban people--even though the latter may have better shelter.

MEAN RATIOS (FARM-TO-URBAN) OF SURVIVAL RATES

	3 Light Attacks	5 Heavy Attacks
Urban and farm shelter equal	1.17	1.70
Farm shelter inferior	0.94	1.36

Regional Differences With Respect to Urban and Farm Elements

We have taken separate note of survival disparities as between regions and as between populations. It is appropriate that we have at least a glimpse of these two types of disparities jointly. Figure 5 assists us to that end. It shows urban and farm survival rates* in two adjacent regions. Such rates are shown separately for four (of our five) heavy attacks, and for three alternative wind conditions for each attack. The instances selected for this display are mostly extreme ones; disparities are not ordinarily so great.

If we look at the plot for wind 1 in part (a) of Fig. 5 (in the upper left of the chart) we see that the survival rate for farm people exceeds that for urban people by a large margin in the Northeast, while the margin is small in the neighboring Southeast. The situation graphed in the lower right corner (Fig. 5(d), wind 6) is pretty much the reverse. There, farm and urban people fare about alike in the Northeast, while a substantial disparity occurs in the Southeast. Intermediate cases can be seen.

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*Urban and farm people are assumed to benefit equally from shelter.

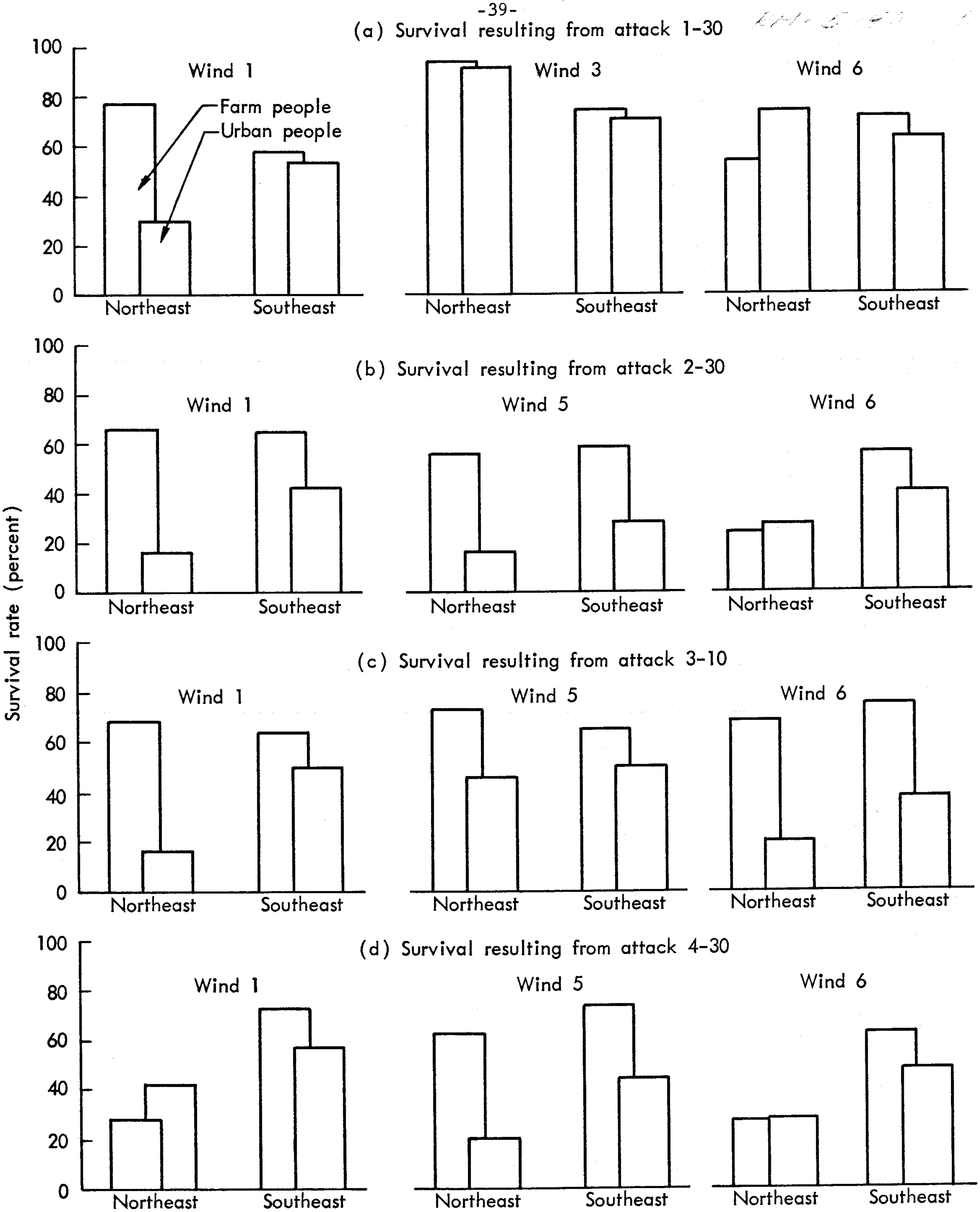

Fig.5—Some instances of extreme survival relationships between urban and farm populations in adjacent regions (p. 64 identifies winds used)

P 39

FIG 5

One of the more interesting facets illuminated by Fig. 5 is the great variability, at the extreme, in disparities between farm and urban survival within a region. Looking at part (a) of Fig. 5, we see that in the Northeast the two populations may fare pretty much alike (wind 3), or that winds may favor farm survival by a wide margin (wind 1), or even that the urban survival rate is higher by a substantial margin (wind 6). It is variability like this that implies great difficulty in long-range planning of rescue, aid, and recuperation activities.

Magnitudes of Computed Results in Perspective of Historical Precedents

While nuclear war might produce no greater disaster than some from which civilization has managed to recover, it is at least conceptually capable of producing a disaster of unprecedented proportions. The rates of devastation calculated for our three light attacks fall within or near the range experienced by nations that participated in World War II. But the rates of devastation calculated for our heaviest attacks have not been matched since the fourteenth century (except of course in quite local disasters), and even so the match is not usually a good one. A century of war, famine, and pestilence failed to reduce the population of Europe by as large a proportion as that by which our three heaviest attacks might be expected to reduce the population of the United States.

Thus, reference to historic precedents is at best only a limited source of encouragement. Societies--usually smaller ones than ours, and always poorer ones--have been able to withstand impressively large losses of people (fourteenth-century Europe), or of wealth (Japan), or of both (Poland and, most notably, the USSR). Their urban sectors have typically suffered disproportionately. And in at least one major instance--that of the Soviet Union's World War II experience--the catastrophic events were concentrated in one major region, while much of the rest of the nation felt only indirect effects.

So there are some interesting parallels to be observed between the events that we have modeled and the kinds of disasters from which good (and usually rapid) recoveries have been made. But the fact

remains that damage on the scale that our calculations indicate would be associated with heavy attacks has virtually never been recorded. Our calculations are, as we shall see, fallible, but if they have any relavance to reality at all, the nuclear potential is indeed an awesome one.

Fallibility of our Computations as Predictions

Of course, as has already been pointed out, our purpose has not been to predict either the size or the nature of any attack that might actually be laid on. Our intended focus, rather, has been on possible disparities. This entire study, including the attack designs, has been structured in a way calculated to identify the kinds of disparities that might conceivably result from nuclear attacks in general, and to take the measure of those disparities. It follows that any correspondence between our attacks and attacks designed in deadly earnest will be imperfect--and that the overall damage levels implied by our attacks will have only the loosest connection with what might result from real nuclear attacks.

Even if the attacks for which computations have been made in this study were realistic, the calculated results would not merit being regarded as predictions. It is a common failing of "damage assessment" models (as models such as that used to obtain survival rates for this study are usually called) that not all damage mechanisms are taken explicitly into consideration.

Damage assessment procedures can only reflect their designers' appreciations of the mechanisms by which attacks cause damage. If the scientific community doesn't understand a mechanism very well, a model builder is apt to model it badly or not at all. And, by and large, the greatest sin of those who have created damage assessment models is the sin of omission. In a sense, this is the way it should be; omission is the lesser of the two sins. For the sad fact is that predicting damage is an uncertain enough business even when attention is restricted to the part of the picture that is relatively predictable; to go further is for most purposes either unhelpful or worse. Damage assessors are properly reluctant to contaminate what they suppose they can do well with what they know must be highly conjectural.

In practice, this currently means that firestorms and conflagrations, which might be major contributors to damage and casualties in some places and negligible ones in others, are not explicitly modeled. Sometimes the radius to which damaging blast effects are assumed to extend is arbitrarily enlarged in an attempt to compensate for the inability to model firestorm phenomena usefully, sometimes not. (We ourselves incline to use 6 psi peak overpressure as a threshold for blast damage in preference to some higher value partly on these grounds.)

The general inability to model the subtler or more complex damage mechanisms also means, in practice, that second- and higher-order damage mechanisms are left unquantified. We neglect, for example, the possible reinforcing effects of injuries from multiple causes (burns, contusions, and ionizing radiation) as contributors to increased fatality rates.* And we leave uncalculated the influence of postattack stresses other than those directly involving weapon effects.**

Finally, in accordance with general practice in evaluating the impact of hypothetical nuclear attacks, we give no consideration to the possibility of nonnuclear weapons being employed along with nuclears. The additional fatalities that might be caused by nonnuclear weapons themselves, or by the synergistic effects of nuclear and nonnuclear hazards in combination, are thus not accounted for.

There are, then, important reasons why anyone inclined to assign predictive value to our estimates should hesitate to do so. In brief, our estimates (in common, of course, with related estimates from other sources) involve some substantial biases toward understating fatalities. While we have tried to compensate for some of those, it is to be supposed that we have not entirely succeeded. What we can hope is that, though

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*On synergy, see Arnsten, Michael E., Sensitivity of Mortality Estimates to Uncertainties in Some Nuclear Damage Parameters, The RAND Corporation, RM-4706-TAB, November 1966.

**How very important these might be is suggested by the Soviet World War II experience. Of the 25 million Soviet deaths in consequence of World War II, it appears that no more than 15 or 16 million can be ascribed to anything like direct military action. (Cf. Brackett, James W., loc. cit.) The remainder were presumably due to some mixture of deprivation, exposure, anxiety, and overwork--and perhaps partly to internal police action.

the general level of damage (or survival) may be in error, disparities within the broad aggregates are suggestive of those which might actually be experienced--if not for the precise weights of attack with which they are associated in this study, then for some comparable weights.

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Section III will describe a variety of modeling considerations necessary to a detailed appreciation of the calculated results. Readers content with a general appreciation may skip to the further treatments of study findings presented in Secs. IV and V. Concluding reflections will be found in Sec. VI.

III. ESSENTIAL NATURE OF THE ESTIMATION PROCEDURE

APPROACH

Introduction

Our concern was with the intersection of two sets: the set of weapon effects (prompt and residual); and the set of populations (people, of course, and in various categories, but also such nonhuman entities as livestock, crops, land, and industrial and other activities). Our problem was to delimit the extents of the intersections, and to comment on their significance.

Thus stated, however, our task would have been boundless. Every conceivable set of targets, every set of weapon allocations, and every set of fallout winds tends to produce a distinctive intersection of weapon effects with each and every population set. A necessary preliminary, then, was to identify which of all the conceivable intersections would prove to be worth individual attention.

Partly this was a matter of deciding which seemed the most probable. But prudence demanded that we look beyond the probable to those additional intersections which, though perhaps relatively unlikely, would produce problems of particular moment if they did eventuate. These two principles provided enough leverage to keep our course away from totally uninteresting cases. As a practical matter, however, continual alertness and restraint were necessary in order to avoid wasting effort on cases which differed too little from one another. Our study was aimed at developing new insights, and calculations were to be avoided unless there was at least some promise that appreciable increments in knowledge would result.

While it was sometimes fairly obvious which calculations were promising and which were not, such was by no means the usual circumstance. In general it was necessary to bolster intuition with data generated for the purpose, so the spectrum of possibilities was systematically scanned for interesting cases. A crude scanning model was developed in order to perform this preliminary step economically.

Indications thus obtained were used as a basis for devising cases for more painstaking investigation--investigation then carried out with the aid of a Quick Count variant which was developed expressly for the occasion.*

The procedure sketched in the preceding paragraphs (which will be the subject of the remainder of this section) underlies the greater part of our study.** When deviations were made from this procedure (as in that part of Sec. IV's demographic analysis where attack impact on an exemplar city is under study), or where refinements or extensions of our basic procedure were made (as in Sec. V's evaluation of post-attack economic potential), modeling is discussed in conjunction with presentation of results.

Modeling Requirements

In brief, then, what we did required us to model the geographic distributions of various populations--28 in all, mostly animate and mostly human. We had to model, also (and in compatible terms), distributions of alternative target sets. And we had to devise attacks against these target sets. That is, we had to make hypothetical weapon assignments to the various target elements. Once this had been accomplished, we were ready to turn to an adaptation of Quick Count which had been made for this study and to use it for generating intersection data--i.e., for calculating the number (or percent) of elements of each population exposed to ambient hazards within various intensity intervals.

The essentials in this sequence of steps are described below.

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*Quick Count, as RAND's hazard (or casualty) prediction model, has been described in two publications: (1) Wegner, L. H., Quick Count: A General War Casualty Estimation Model, The RAND Corporation, RM-3811-PR, September 1963 (Unclassified--For Official Use Only); and (2) Cohen, N. D., The Quick Count System: A Users' Manual, The RAND Corporation, RM-4006-PR, April 1964 (Unclassified--For Official Use Only).

**Quite a different procedure is used by Heer, David M., in After Nuclear Attack, Frederick Praeger, 1965.

INPUTS TO THE ESTIMATION PROCESS

Population Representations

The identities of the populations with which we would deal, and the degree of aggregation with which we would represent them, were established not only with regard for the fundamental purpose of furthering understanding of possible postattack circumstances, but also with consideration for the qualities of the principal data-processing tool (Quick Count) available to us, and for the kinds of population data that were readily obtainable. It was our conviction that a collection of meaningful results could be obtained without recourse to complex and expensive analytical procedures such as those embodied in JUMBO* and PARM,* and we therefore set out to obtain data whose degree of aggregation was compatible with Quick Count's character.

Quick Count had originally been designed to handle populations represented as being distributed among several thousand monitoring points (rather than several tens of thousands, as in the case of JUMBO). Since there are, within the 48 conterminous states, approximately 3000 counties, and since the Bureau of the Census publishes a great variety of data at the county level of aggregation, it appeared to us that such data might constitute the basis of a satisfactory population representation for Quick Count use in the service of this study. Actually, experimentation revealed that fidelity required some elaboration--most clearly in the direction of accounting separately for large parts of the urban populations with which we were to deal. This was accomplished by establishing a separate monitoring point in each city (some 300) having at least 50,000 inhabitants, and by attributing to each such additional monitoring point whatever population elements 1960 census data associated with the corresponding city.**

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*Cf. National Resource Evaluation Center, <u>Analytical Program Compendium</u>, NREC Technical Memorandum No. 119 (Revised), December 1964.

**Within New York City a separate monitoring point was used for each borough.

The main source for our population representation could thus be the tape transcription of the <u>County and City Data Book, 1962</u>.* In order to locate monitoring points within Quick Count's coordinate system, a matched set of county latitudes and longitudes (corresponding to population centroids) was also obtained from Census; city coordinates (similarly representing population centroids) were prepared at RAND.

It should be noted that all populations within any city were thus attributed to a common monitoring point, and that, except for a modification to be described shortly, rest-of-county populations--of whatever type--would also have been attributed to (another) common monitoring point. Such a representation might, of course, be quite unrealistic within any one city, or within any one county. However, our Quick Count results are invariably aggregated over many such units, and early tests revealed that local errors tended to offset one another a large part of the time.

There was one connection in which this was not true initially, and where improvement in our population representation became necessary. This was with respect to rural populations, and most especially those in California and the Pacific Northwest--where counties are both large (with the possibility that monitoring points could be misplaced some considerable distance), and few (so that the law of large numbers would be of little avail). Early experimentation made it clear that some improvement in our representation of rural populations was called for.

The problem was one of reducing the overall significance of local errors. The solution chosen involved two accommodations: (1) assuring that misplacement of a monitoring point was generally not such as to cause an intolerable error in exposure estimates; and (2) assuring that no errors would be weighted heavily in the aggregates which were to be computed. These accommodations were achieved by replacing some of the original county points with new ones better suited to reflecting the location of rural populations.** (The original monitoring points

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*U.S. Department of Commerce, Bureau of the Census.

**Coordinates, supplied by the National Resource Evaluation Center, are those for Category B-2 (Cropland) as identified in that agency's <u>Resource Data Catalog</u>, NREC Technical Manual No. 134, May 1963. We treated population items 1, 7, 38, 135, 148-153, and 159 (Table 1, p. 52) as "rural" in this connection.

continued to serve, of course, as locators for rest-of-county nonfarm populations.) In order to assure that exposure-error estimates would be small, the counties in which such monitoring point replacement was undertaken were primarily those containing targets. It is close-in that the intensity of weapon effects changes rapidly with distance from detonation. By correcting monitoring point locations there, we were reducing the likelihood that faulty locations would have much influence on calculated local exposures. The other counties in which monitoring point replacement was undertaken were those which are especially significant in terms of population. The best available monitoring point was used in any county that accounted for more than 3 percent of the regional total in one or more population categories.

The upshot is that there are, in total, 3990 monitoring points, of which 315 are exclusively urban (one for each city having at least 50,000 inhabitants in 1960, plus one for each borough of New York City). The remaining 3675 monitoring points locate rest-of-county populations in the 3105 counties and county equivalents for which census data are given in the County and City Data Book, 1962. In 2535 of the 3105, a single monitoring point serves all populations, while 570 have dual monitoring points--one for locating rural populations and one for urban populations.

In accordance with standard Quick Count practice, populations are treated as being at these monitoring points for the purposes of fallout calculations, while for the purposes of prompt-effect calculations these points are merely the centers of circular-Gaussian population distributions. This is a priori a sensible arrangement: Fallout is a large-area effect and exposures to it will, when averaged over any substantial number of locales, be fairly insensitive to how the population is located in the small. (Variability of exposures in response to wind differences is, for example, more important.) At the same time, prompt effects are quite local in their impact, and therefore local distributions should be as realistic as is practical. A properly dimensioned Gaussian distribution whose mean is well chosen accomplishes this.*

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*Note that in this study Gaussians are centered on monitoring points which are so located as best to represent the actual centroids of populations. The distortions involved in first collecting populations within the cells of some arbitrary grid have thus been avoided.

The variances of our Gaussians were established with due care. In the cases of nine very large cities, variances were determined city-by-city, by reference to detailed intracity population distribution data derived from the (1950) population census (adjusted for growth to 1960). For the remaining cities, variances were determined from the equation

$$\sigma_N = R_{MP}/1.8$$

where $R_{MP} = (A/\pi)^{1/2}$, and "A" is the 1960 area of the city in question.

This relationship was determined after examination of actual (1950) population distributions for 25 large U.S. cities. The examination had revealed that R_{MP}--that is, the radius of a disc whose area equalled that for the city in question--is capable of enclosing about 80 percent of the average city's population. It had also supported the notion that a city's population is distributed in what seems to be a Gaussian manner. In a circular-Gaussian distribution, 80 percent of the population is included within 1.8σ from the origin.

The value of σ_N is also significant with respect to representations of rest-of-county population distributions, but we had little choice but to be arbitrary here. (There is no assurance that rest-of-county population distributions even bear a close resemblance to Gaussians. They will often be quite flat.) Rather than leave the populations of a county collapsed into a point--which would have been extremely unrealistic--we modeled them as Gaussian, and arbitrarily let $\sigma_N = R_{MP}/2$, which (1) is in a plausible range: $R_{MP}/1.25 > \sigma_N > R_{MP}/3$; (2) gave, in conjunction with $\sigma_N = R_{MP}/1.8$ for cities, results closely matching those obtained with the original 7508 monitoring point Quick Count runs; and (3) reflects the likelihood that the chosen county centroid is at a concentration of population, rather than simply being the center of gravity of, say, a flat distribution.*

We early made various experimental calculations in an effort to throw light on the suitability of our population distributions to the demands that were to be made of them. Those tests all support the inference that in general our model gives valid results. Certainly

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*Results are not very sensitive to the rest-of-county σ_N assumption. A test showed that changing that assumption by a factor of 1.25 affected computed prompt-effect coverages by a factor of only 1.03.

the population distribution finally devised is adequate where survival estimates are nationwide in scope, and it appears ordinarily to be adequate even when our interest is in regional results. However, the more elaborate calculations made during the final stages of the study revealed, when subjected to analysis, that survival rates for populations in the Far West are overly sensitive to the precise locations of particular monitoring points. In other words, our attempt to improve the population representations in the West fell somewhat short of the mark.* Results for California, in particular, should on this account be interpreted with special care.

A quantitative discussion of some aspects of population model accuracy is in Appendix A.

. . .

The particular population entities for which calculations were made are a subset of the 161 items tabulated in pertinent parts of the County and City Data Book, 1962. Many of the items could be disregarded without undue sense of loss because of their slight relevance to our concerns. We were able in good conscience to delete items on nativity, migration, births, deaths, marriages, and housing quality (with telephone? with freezer? with TV? etc.). Beyond this we were selective and used only key items from among the many relating to wholesale and retail trade, governmental and other services, etc.

We deemed it important to include items representing the entire spectrum of economic activities, and did this mainly in terms of a full breakdown of the labor force, although other terms had to be resorted to in the interest of disaggregating agriculture. We wanted to address the question of age-dependence in human attack survival, and laid the ground for this by including the population as a whole and the extreme ends of the age distribution--children under 5 years of age, and adults age 65 and over. We wanted to establish whether attacks discriminated for or against the more productive elements of

*Indications are that no fully satisfactory fix could have been achieved without subdividing the most extensive western counties. To do that realistically was beyond the resources of this study.

society, and therefore introduced, as a proxy, families with incomes of $10,000 and over. And so on. A complete listing of the 28 entities for which calculations were made is included as Table 1.

These populations are vulnerable in varying degree to each of the several damage mechanisms associated with nuclear detonations. However, we deemed it desirable generally to avoid involvement in the intricacies of damage calculations. Instead we chose to compute the number--or percent--of each population so situated that the ambient hazard could be expected to fall within one or another of several specified intervals. Trial calculations, performed in some detail, established that under present-day conditions the proportion of people situated where ambient hazards involved less than 6 psi peak overpressure and less than 3000 roentgens dose (integrated over the first two weeks) was approximately equal to the proportion of people who would survive, as reckoned by a fairly elaborate calculus. We have exploited that coincidence. The specified pair of values were given the status of a standard reference hazard, and many of the comparisons discussed have been based thereupon. In fact, this standard reference hazard was the basis for virtually all the comparisons of calculated results in Sec. II, and for any other comparisons not explicitly described as relating to some other standard.*

Target Eligibles

The identities of the installations against which an enemy would choose to deliver nuclear weapons cannot be presumed known. Whichever nation might one day prove to be the adversary, and whatever its contingency strike plans may be like today, we cannot be sure how the nature of some future attack would be affected by developments between now and then. The best that we can do is to take cognizance of conceivable weaponry and of such declarations of attack philosophy as can be found, and to translate these into sets of plausible target candidates. We are then left with the task of assembling sets of such

*Of course, no single standard is equally applicable to all populations or all circumstances. We noted earlier that separate standards might sensibly be applied to farm people and to urban people (pp. 33-40).

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Table 1

LIST OF SELECTED POPULATION CATEGORIES

Item No.[a]	Category Name
1	Land area
3	Total number of people
6	Number of urban people
7	Number of rural farm people
10	Number of children under 5 years
12	Number of people 65 years and over
24	Number of families with income of $10,000 and over
25	Aggregate income
37	Number of employed persons: Total
38	Number of employed persons: Agriculture
39	Number of employed persons: Construction
40	Number of employed persons: Durables mfg.
41	Number of employed persons: Nondurables mfg.
42	Number of employed persons: Transportation and other public utilities
43	Number of employed persons: Wholesale and retail trade
44	Number of employed persons: Finance, insurance, and real estate
45	Number of employed persons: Education
46	Number of employed persons: Public administration
74	Demand deposits
94	Value added by manufacture
135	Land in farms
148	Value of farm products sold: Total
149	Value of farm products sold: Crops
150	Value of farm products sold: Dairy products
151	Value of farm products sold: Poultry
152	Value of farm products sold: Livestock
153	Number of cattle and calves on hand
159	Commercial fertilizer used

[a]Coincides with number used in County and City Data Book, 1962.

target eligibles into alternative attack designs which have some degree of plausibility and which are, altogether, capable of illuminating the issues with which we are concerned here.

For help in identifying classes of installations that might be considered attractive targets for nuclear weapons we turned, at the beginning of this study, to published statements by ranking military officers of a major nuclear power--the USSR. The statements consulted appear in Soviet Military Strategy, a comprehensive work prepared by fifteen Soviet officers headed by Marshall V. D. Sokolovskii, long-time First Deputy Minister of Defense and Chief of the General Staff of the Soviet Army and Navy.*

Chapter 2 of that work is devoted mainly to sketching U.S. military preparations (see especially pp. 171-191), and identifies principal weapon systems--e.g., interceptors--and systems--e.g., SAGE--for co-ordinating and controlling their use. Explicit statements that give the appearance of reflecting targeting doctrine are included in Chapter 6, particularly in the subsection captioned "Methods of Conducting Modern Warfare" (pp. 398-424).

For example, we excerpt the following from Sokolovskii, et al.:

> Nuclear strikes by missile and aircraft can subject to destruction military bases (air, missile, and naval); industrial targets, primarily nuclear, aircraft, missile, power, and machine-building industry; communication networks, ports, control points, etc. ...
>
> Such blows can devastate the major regions of enemy states, where the economic war base of the imperialist coalition is located; where their strategic nuclear weapons (i.e., the strategic air forces, intercontinental and medium-range missiles), tactical bombers, and naval forces are based; and where the main stocks of nuclear munitions, war materiel, assembly areas for units and formations, major troop concentrations of the armed forces, strategic reserves, and principal centers of governmental and military control are located.
>
> --Soviet Military Strategy, p. 408

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*The edition available was an annotated English translation prepared for the USAF by The RAND Corporation, and is available, under the title cited, as RAND Report R-416-PR, April 1963.

> A primary target of the strikes will be strategic air bases. The bases of strategic air forces are quite vulnerable since the airfields occupy large areas and all of them are really quite well known. ...
>
> Naturally, the task of annihilating the enemy's nuclear weapons must be reliably executed. It is particularly important to have a reliable reconnaissance beforehand of air bases, missile-launching sites, nuclear weapon stockpiles and supply bases, and locations of fuel stores and control points.
>
> The destruction of the enemy's military-economic potential is one of the most important missions. The key to the execution of this mission is the need for a large number of nuclear weapons to attain decisive results in destroying the enemy economy. ...
>
> The military and economic base of the imperialist bloc is very sensitive to nuclear-missile strikes.
>
> --Soviet Military Strategy, p. 409

Many installation types besides those alluded to in the excerpts above receive explicit mention by Sokolovskii.

From these and other passages in Soviet Military Strategy we derived a list of military installations and other entities that evidently are viewed as appropriate targets for nuclear weapons. The list is reproduced as Table 2.

Having once identified the types of targets that might be considered worthy of nuclear attack, the next steps were to itemize the elements of each type, and to supply geographic coordinates, item by item. These detailed listings were constructed primarily from unclassified sources,* supplemented, when necessary, by classified ones.**

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*Unclassified sources included Air Force Magazine, September issues in 1963 and 1964 (for airfield functions); Dudley, V. S., and J. A. Wilson, Civil and Military Airfields in the U.S. ZI: Physical, Climatic, and Facility Data, The RAND Corporation, RM-3301-PR, September 1962 (Unclassified--For Official Use Only) (for airfield locations); USAF Installations Directory, AFR-190-16 (Unclassified--For Official Use Only) (certain issues of which contain data on missile launch facility locations); etc.

**The Technical Analysis Branch of the Division of Biology and Medicine, Atomic Energy Commission, provided us with access to Nuclear Attack Hazard in Continental U.S. 1963, Vol. III, Annex B, "Potential Targets Considered," (U), Department of Defense/Office of Emergency Planning, March 1963 (Secret). Neither the identities nor the locations of individual installations are disclosed in this Memorandum.

Table 2

PRINCIPAL TARGET CATEGORIES

Identification No.	Category Name
1	Seaports
2	Carrier berths
3	Antisubmarine warfare bases
4	Urbanized areas
5	Petroleum refineries
6	Civil communications
7	Army communications
8	Navy communications
9	Air Force communications
10	Control centers
11	Marine Corps personnel centers
12	Army personnel centers
13	Bomber dispersal fields[a]
14	Bomber bases
15	Air defense bases
16	SAGE centers
17	Tactical air bases
18	Military Air Command bases
19	Nuclear weapon storage sites
20	Experimental or training missile launchers
21	Titan missile launchers
22	Minuteman missile launchers
23	Miscellaneous

[a]A synthetic list having no official standing.

(The locations of classified sites cannot be deduced by reference to data contained in this Memorandum.) Precise locations, usually expressed to the nearest minute of latitude and longitude, were taken preferentially from unclassified sources even when this introduced errors, so long as the errors were of little consequence for our purposes.

An attempt was made to identify some sensible cutoff point for installations in a given category. In the case of air bases, no such cutoff could be established short of exhausting all bases of a given type. This was true as well with missile launch facilities. The list of petroleum refineries was truncated at the 50th ranking unit; 75 percent of U.S. capacity is accounted for by these 50 facilities, with the balance made up by a great many small units. (To reach 100 percent would require including six times as many.) The number of urbanized areas included was somewhat arbitrarily fixed at 30, but these 30 contain half the U.S. urban population. Beyond that, the selections can only be said to reflect our best judgments about military worth.

Altogether, the number of target eligibles came to just over 1700, approximately 1100 of which are missile launch facilities. Military air bases number almost 200 (plus dispersal fields). Communication facilities, civil and military taken together, number 100. Other categories are individually small. (A more detailed breakdown appears on a later page.)

Attack Design Preliminaries

The extent to which any population would be affected by a nuclear attack depends upon proximity relationships. These of course vary a great deal from one individual target to another. At the same time, we know from work done previously at RAND that some _kinds_ of targets are more likely to be imbedded in large urban concentrations than others.* We expected to encounter the same tendency again. However,

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*Cf. Hanunian, Norman, _The Relation of U.S. Fallout Casualties to U.S. and Enemy Options_, The RAND Corporation, RM-2747, May 1961 (Unclassified--For Official Use Only); also, McGarvey, D. C., _Collateral Civil Damage from Military Attacks in General War_ (U), The RAND Corporation, RM-3685-PR, October 1963 (Secret--Restricted Data).

we had become concerned with multiple intersections--many populations now interested us, rather than just one--so that some new analysis was called for.

A straightforward approach might have involved immediate resort to a damage assessment procedure such as RAND's Quick Count--running a great variety of attack patterns sequentially against each population that was deemed of interest. However, even as efficient and fast-running a program as Quick Count would in the end have proved unbearably costly had it been used to assess all possible intersections. Since we had already reduced the number of populations as much as we cared to, and had no adequate reason for rejecting any substantial fraction of the target elements we had just identified, our only hope was somehow to settle upon a greatly restricted set of attack patterns to consider. Fortunately, a very inexpensive procedure was available for doing this, provided only that we were willing to put up with its crudity. It was a simple sorting routine that took no explicit account whatever of weapon effects.

What we did have to do was identify the county or counties with which each of our 1700-odd targets is associated. Thereafter, upon specifying any subset of these targets we could use simple sorting routines to pull out the associated counties, collect their populations, and perform other simple arithmetic operations. We could, for example, compute average population densities in some set of counties that had been identified as having imbedded in them elements of a particular class of targets. Figure 6 shows how such computed population densities compare with the corresponding densities for the United States as a whole.

Target classes are arrayed along the abscissa, roughly in order of their association with the population-at-large. The ratio D_i/D_o on the ordinate is simply the density of the stated population in counties associated with the ith class of targets relative to the nationwide average density of that same population. Each curve relates to a different population.

Thus the curve labeled "urban population" indicates that in those counties associated with the principal petroleum refineries (item "R") the urban population is 16 times more densely settled than it is in

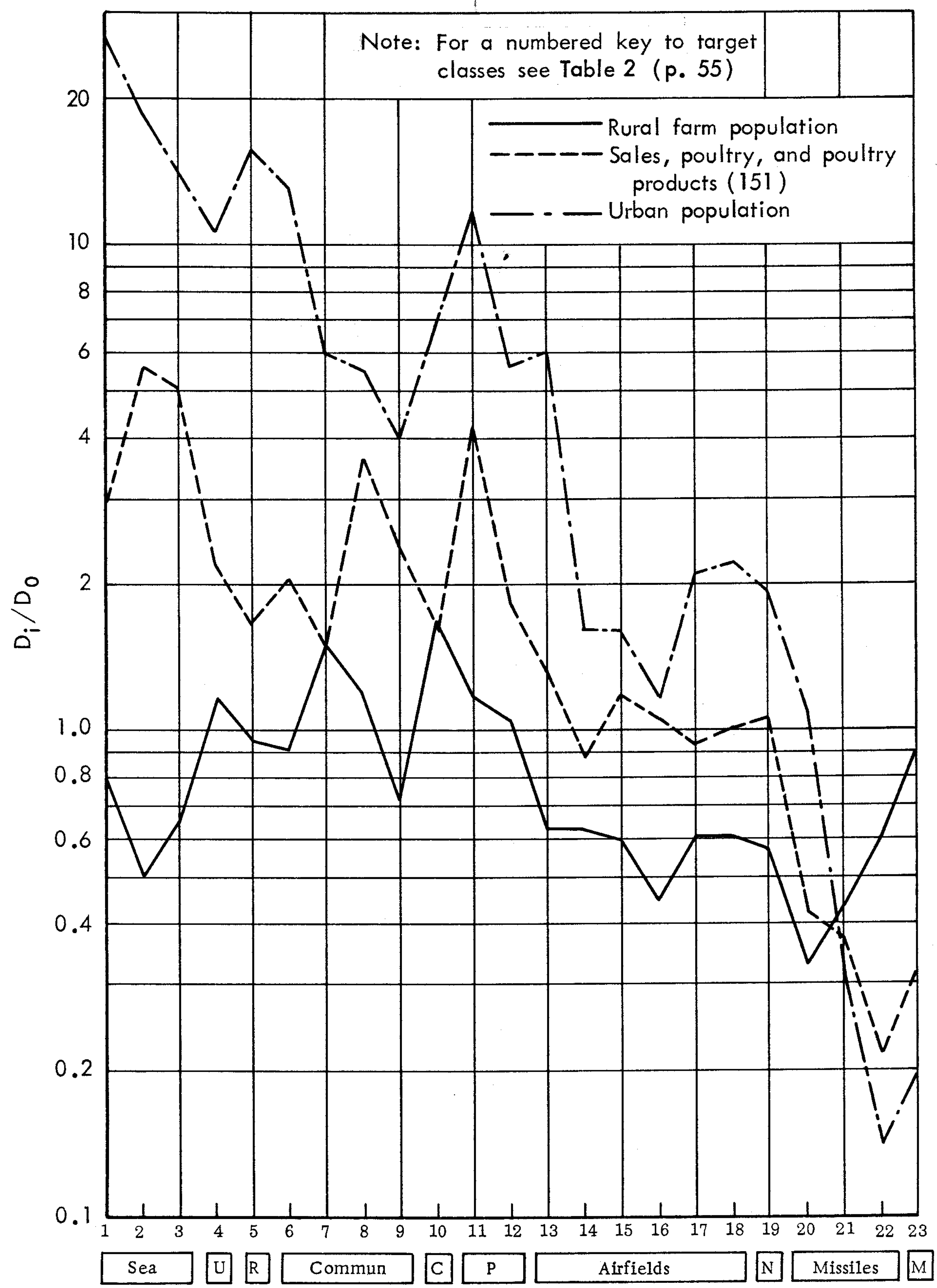

Fig. 6—Relative densities of selected populations in target vicinities, by class of targets

the United States as a whole. Similarly, it indicates that those targets whose principal claim to attention derives from storage of nuclear weapons (item "N") have been situated where the density of urban people is only about 1.9 times the U.S. average. (Coding of the target sets is indicated in Table 2, p. 55.)

Two main points are documented by Fig. 6: (1) If we classify installations by the characteristic that makes them attractive as targets, and assemble sensible numbers within each class, we can expect to find that some target types are more characteristically imbedded in densely populated areas than are others, and that the differences are large. (2) Secondly, the degree by which the density nearby exceeds the national average varies markedly with the type of population that is of interest--here between the urban population and the rural farm population, of course, but also between the rural farm population and a somewhat particular farm activity, the sales of poultry and poultry products.

These three curves illustrate the perspective afforded by one sort of slice through our data. With each curve representing a single population, we see full detail by target category but are limited to examining only a few populations at a time. If we slice our data in another plane, we can depict full population detail but have to restrict ourselves on the target side to only as many curves as can easily be distinguished. This is the basis on which Fig. 7 has been constructed.

Here populations are arrayed along the abscissa, each curve relates to a particular target set, and the relatives on the ordinate are defined as before. This figure illustrates the degree of correlation, for a given attack objective, among the various associated populations. Note that each of the three curves stays largely within a limited--and distinctive--range over much of its course. The exceptions turn out, in most instances, to involve an agricultural population of one sort or another. (Table 1 constitutes a key to Fig. 7.) Notice, too, that the three curves do not have, in detail, common forms. In fact the one that is generally uppermost (the one involving refineries as the targets) comes closer to being a mirror image than a twin of the bottom curve (which relates to Minuteman missile sites).

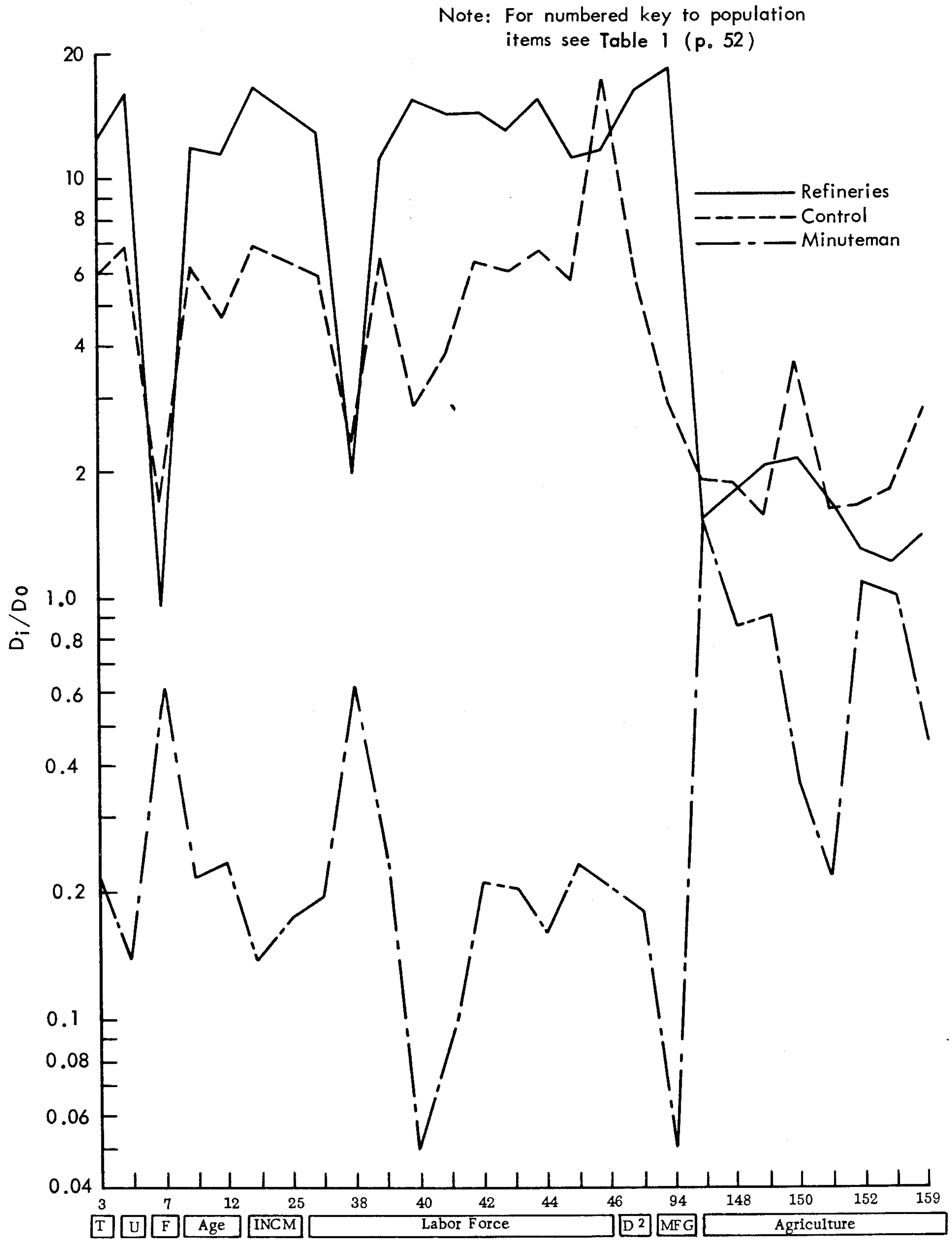

Fig. 7—Relative population densities in vicinities of selected targets, by population type

This mirror-image relationship between the top and bottom curves suggests that anytime we begin mixing one homogeneous class of targets with another, we are apt to find the curve for the mix to be much smoother than those displayed here. The peaks of one curve may be largely offset by the troughs of another.*

Nevertheless, systematic inspections of relationships like these between our more than 20 pure target classes and the nearly 30 selected populations was--and is--a welcome technique. It enlightened us about the possibilities for combining subsets of targets in ways that implied particularly gross damage disparities of one sort or another, and it did this at very low cost. Whether combinations to which we were thus attracted are plausible is, of course, a matter for separate judgment. The important fact is that we were provided with insight into the extent of the problem space. We minimized the risk of overlooking some potentially critical attack outcome merely because it derives from an attack design currently believed improbable.

Target Systems and Attack Designs

On the basis of the procedure just described we were able to design a set of five quasi-realistic target systems which, among them, promised to yield survival disparities that were varied enough in kind and extreme enough in size to represent fairly well the range of possible attack outcomes. The five alternative target systems and our hypothetical allocations of weapons are defined in Table 3. Note that eight attacks were based on the five target systems. We experimented with alternative weapon yields (a factor of 10 apart) in connection with three of the target systems, but posited only a single yield in connection with each of the other two. Generally a given installation

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*Some policy implications are fairly apparent. Consider, for example, the siting of ICBMs. Whatever principles were used in selecting Minuteman missile sites, a result was to minimize collocation with manufacturing populations (items 40, 41, and 94). Yet this would have a relatively small effect on the survival of manufacturing if some more highly collocated set of installations--say, refineries as they are presently located--were also targeted.

Table 3

TARGETING

Category	Approx. Number[a]	Inclusiveness	Weapon Allocation (yields in megatons) by Target System: #1 Low Collocation	#2 High Collocation	#3 Indiscriminate	#4 Low Collocation + Urban	#5 Pure Urban
Urbanized areas	30	50% urban				10/100	100
Seaports	20	75% berths			10		
ASW bases & carrier berths	20	Selected		3/30	10		
Petroleum refineries	50	75% cap.			10		
Civil communications	55	Selected		3/30	10		
Control centers	15	Selected	3/30	3/30	10	3/30	
Bomber dispersal fields	65	Synthetic		3/30	10		
Bomber bases	50	All		3/30	10		
Tactical air bases	25	All			10		
Air defense bases	60	All			10		
SAGE centers	20	All			10		
Military air transport bases	60	All			10		
Navy communications	15	Selected	3/30	3/30	10	3/30	
Army communications	15	Selected			10		
Air Force communications	15	Selected	3/30	3/30	10	3/30	
Marine Corps personnel centers	15	Selected			10		
Army personnel centers	25	Selected			10		
Titan II	55	All	3/30		10	3/30	
Minuteman LCCs[b]	95	All	3/30		10	3/30	
Minuteman launchers	950	All	0.3/3			0.3/3	
Miscellaneous	50	Selected	3/30	3/30	10	3/30	
TOTAL NUMBER WEAPONS			1195	285	725	1225	30
TOTAL MEGATONNAGE			1,020/ 10,200	855/8550	7,250	1,320/ 13,200	3,000

[a]Numbers have been rounded, commonly to the nearest 5 units.

[b]Launch control centers.

Selected nuclear weapon storage facilities are accounted for within the tabulation, although their number is not shown separately.

received only a single weapon, but targeting was done on the basis of installation function, and installations having more than one targetable function (i.e., appearing on more than one line in Table 3) were assigned additional weapons accordingly.

For calculational purposes all weapons were treated as surface bursts, so that Quick Count would generate fallout as well as prompt hazard data.* However, weapons may be interpreted as having been either surface-burst or airburst. Under the former interpretation, the prompt-effect circle corresponds to a peak overpressure of 6 psi, and fallout must be reckoned with; under the latter, a higher overpressure--say, 9 psi--corresponds to the weapon radius used, and local fallout can be neglected.

The total delivered weight of any attack included is simply a summation, over all designated target classes, of the number of targets in a class multiplied by the individual yield chosen for that class. The weapon yields used are generally large, and so spaced as to give some indication of what consequences (in terms of survival disparities) would follow from attacks emphasizing yields in any part of the 1- to 100-MT interval.**

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*Residual radiation was quantified on the assumption that, per kiloton of total yield, the radioactive debris which ultimately appears as local fallout would suffice to produce a radiation rate of 800 roentgens per hour one hour after attack (under the standard, if artificial, condition that the same debris was then spread uniformly over a smooth plane one mile square). This is quantitatively reconcilable with the Area Integral given in par. 9.183 of The Effects of Nuclear Weapons, 1962 via the logic of par. 9.184 in that source, provided that the fission fraction is taken to be approximately one-half. It is, however, consistent with a variety of combinations of gamma activity level and fission fraction, including 1000 and 0.8, 1333 and 0.6, and 2000 and 0.4.

Sensitivity to assumptions about the fission fraction and the gamma activity levels has been discussed in other reports. Cf., e.g., Hanunian, N. A., The Relation of U.S. Fallout Casualties to U.S. and Enemy Options, The RAND Corporation, RM-2747, May 1961 (Unclassified--For Official Use Only); also, Arnsten, Michael E., Sensitivity of Mortality Estimates to Uncertainties in Some Nuclear Damage Parameters, The RAND Corporation, RM-4706-TAB, November 1966.

**It may be noted that the Quick Count model was originally developed for use in this yield range and is particularly well suited to it. Also, our population representations are better suited to megaton-range weapon yields than to smaller ones.

Other Modeling Aspects

It was never our intent to explore intrawar matters, and military interactions were therefore not modeled. We took no account of problems of weapon delivery except insofar as aiming error would affect prompt-effect calculations. (A nominal CEP of 1 n mi was assumed.) Assignment of a weapon was treated as tantamount to delivery--and to detonation at full yield.

Wind conditions, which are important to the generation of fallout patterns, were represented in the usual Quick Count manner. Here, however, it was necessary to compromise between satisfying a desire to explore the influence of winds as fully as possible, and keeping costs within acceptable limits. The result was that 6 of the 20 wind conditions that had originally been prepared for input to Quick Count were used. Full-scale test cases were run to determine which 6 would tend to maximize the spread of results. The upshot was that the following days' winds were run in conjunction with every case analyzed:

Identification Number	Date on Which Winds Actually Occurred
1	15 December 1951
2	25 December 1951
3	15 May 1951
4	15 June 1951
5	5 July 1952
6	25 November 1950

Prompt effects were represented by a weapon radius scaled as the cube root of yield from a benchmark value of 2.12 n mi at 1 MT. (This corresponds to a radius at which the peak overpressure from a surface burst is 6 psi.) Each detonation was treated as an independent event where prompt effects were concerned.

Nonsubstantive Contributions of Study

The substantive contributions of this study are dealt with in other sections. We should like to mention, however, that certain developments

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which were undertaken in response to the needs of this study can be expected to be useful in other contexts as well. These developments center in the Quick Count model, and the machine program that implements it, with the result that a considerably enhanced damage prediction capability now exists.

In response to our desire to deal economically with multiple populations (rather than the single one for which Quick Count had originally been designed), N. D. Cohen restructured his program so that it would interpret whatever hazard levels it had computed to be present at a given monitoring point sequentially with respect to each of many (up to 36) populations associated with that point. In response to our desire that casualty or damage calculation be divorced from hazard calculation, Cohen altered the program so that it would output, in summary form, the number of population units present where hazards fell within preselected intervals. (Such information is often usable directly--as, e.g., when our interest is in the amount of farmland on which radiation rates are less than 1 roentgen per week in the season following attack.) And the option of computing results in terms of damage, either within Quick Count or as an extension to it, still remains.*

Third, much of the population data contained in the <u>County and City Data Book, 1962</u>, has now been (1) given the map attributes essential for use in a damage assessment program, and (2) put into a format acceptable to Quick Count. The data base available within damage assessment circles has thereby been notably improved.**

<u>Observations on Modeling Influences</u>

It should be evident by now that the attacks evaluated in this study are purely hypothetical. While an attempt was made to take account only

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*Descriptions of these modifications have been incorporated in Cohen, N. D., <u>The Quick Count System: A Users' Manual</u>, The RAND Corporation, RM-4006-PR, April 1964 (Unclassified--For Official Use Only).

**Machine procedures for the necessary data transformations and the sensing and correction of local errors and incompatibilities in source data were devised by Dean Hatch, of RAND's Computer Sciences Department.

of militarily interesting target types, these were assembled into attacks with the prime objective of appraising the potential for unevenness in survival rates. Realism of attack design was at best a secondary consideration. Our choice of yields was motivated by a desire to represent in some degree as large a range as was practical, given cost limits and program capabilities. We made no attempt to ascertain which yields bulk large in the stockpiles of nuclear-capable nations. Nor were overall attack weights influenced by intelligence estimates. Our interest was directed at evaluating the spectrum of possibilities, and we were constrained from extending the range of attack weights considered only by the futility of analyzing cases in which virtually everyone, or no one, would survive.

Thus the various levels of civil damage derived in this study may none of them match those that would result if we were making best estimates of some potential adversary's capabilities and intentions. And even the mixtures of survival to which our calculations lead may be distinctly different from those to be expected, had authenticity of attack design been a prime object. Our object was to gain information about what sorts of disparities might result from nuclear attack--which populations would fare relatively badly, or well, and by what margin in the extreme. Whether margins as large as those computed would be likely is a somewhat different question.

IV. DEMOGRAPHIC ASPECTS

INTRODUCTION

In On Thermonuclear War, Herman Kahn discusses the aftermath of nuclear attack in terms of an "A" country consisting of 50 to 100 of the largest cities, and a "B" country consisting of the remaining rural areas, towns, and small cities.* His object in doing so is to appraise prospects for the nation's recuperation after the "A" country is totally destroyed while the "B" country is unscathed.

While the situation Kahn expresses in terms of this dichotomy is easily recognized as an abstraction, we think we have detected a tendency on the part of his readers to set aside whatever prior notions they may have had about the aftermath of nuclear attack, and to put the Kahn abstraction--or some almost equally dichotomous models of a post-attack situation--in their places. If none of us ever described the aftermath of nuclear attack in more complex terms, the abstraction would eventually become, for all practical purposes, the reality. Only if an attack should actually come would people notice that there was a difference.

We trust that readers will become increasingly conscious that there is a difference as they pursue the pages of this section and the next.

DEPENDENCE OF SURVIVAL RATES ON AGE

If human survival rates depended only on the nature and intensities of hazards to which people would be exposed, it appears that one age group would fare about as well as another. Our calculations show virtually identical exposures (nationwide) for three sets of people: the population at large, children under 5 years of age, and adults 65 and older. Correlation coefficients calculated between proportions of these populations exposed to interesting hazard intensities were comfortably in excess of 0.99 for all eight attacks.

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*Kahn, Herman, On Thermonuclear War, Princeton University Press, 1960. Cf. p. 77.

There are, however, many indications that the very young and, especially, the elderly are inherently more vulnerable than young adults. That is, given some trauma, death rates tend to be substantially higher for individuals whose ages are near either end of the normal life span than for those at intermediate ages. Relevant data for human beings are not plentiful, and, where what may be the most important attack hazard (fallout radiation) is concerned, all but nonexistent. We are, in general, much more dependent than we should like to be on data relating to the right hazard but the wrong species, or, conversely, to the right species but the wrong hazard.

There are two basically different approaches to quantifying age-dependence where susceptibility to nuclear weapon effects is concerned. One is to analyze the record, fragmentary and uncertain though it may be, of what happened at Hiroshima and Nagasaki. The other is to synthesize what could be expected to happen, drawing upon the vast, if not well documented, peacetime experience with traumas akin to those known to be produced by nuclear detonations.

For a first, tentative cut, such as that with which we are here concerned, it probably makes little difference which of the two approaches we take: available data are poor enough so that a substantial element of conjecture must be introduced either way. In the long run, however, reliance on Hiroshima-Nagasaki experience is bound to be frustrating. The bombs used there were not surface burst, so that there was no local fallout--and hence no experience with fallout casualties. Further, both weapons were of low yield, with the result that the several prompt effects were of different importance, relative to one another, than would be the case if megaton-range weapons were used. If we are ever to produce definitive estimates of how susceptibility to the effects of high-yield nuclear weapons changes with age at time of exposure, the second approach will presumably have to be adopted. We begin with it.

We have not been completely successful, however, in finding suitable data to implement this approach. We have had to rely in large part on data generated for insurance purposes, and they have an obvious defect. Having been collected with an eye to rate structures, such data apparently are intended to reveal no more than the incidence of

death, by cause, as a function of age. The probability of death, given exposure to the subject hazard, is there irretrievably combined with the probability of exposure to the hazard.

To the extent that this latter probability reflects only the relative inability of the very young or the very old to extricate themselves from potentially harmful situations, we ought to take account of it. But when it reflects acceptance of above-average risks (as for purposes of employment, etc.), age-dependence is distorted in a way that is probably inappropriate to the circumstances of nuclear attack, and the data are useless for our purposes. We have therefore tried to select only entities for which this last factor appeared to be inconsequential. How well we have succeeded is difficult to evaluate.

Figure 8 displays data describing how sensitivity to traumas varies with age. The curves are somewhat idealized, it having been necessary to disregard an occasional wayward point in order to make essential characteristics clear. But they are based on real data and are presented for their substance as well as their form.* Beyond illustrating what very large differences age makes to human vulnerability, the point of this chart is to suggest that age-dependence is by no means the same with respect to all nuclear hazards. Each of the three elemental curves (the fourth curve is a consolidation of the other three) is intended to serve as a proxy for one of the principal weapon effects.

The connection between deaths in peacetime conflagrations and those in the firestorms and other conflagrations that might be produced by nuclear attack is plain enough. Unless some unrecognized distorting influence is present, this curve should be directly applicable to whatever part of attack fatalities would be occasioned by firestorms and the like.

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*The curves relating to deaths in conflagrations and to deaths in railroad and streetcar accidents were derived from insurance data for female members of the U.S. population. Cf. Dublin, Louis I., and Alfred J. Lotka, Twenty-five Years of Health Progress, Metropolitan Life Insurance Co., New York, 1937.

The curve for leukemia incidence (among human males) was based on a chart devised by Doll, Richard, "Age Differences in Susceptibility to Carcinogenesis in Man," British Journal of Radiology, January 1962.

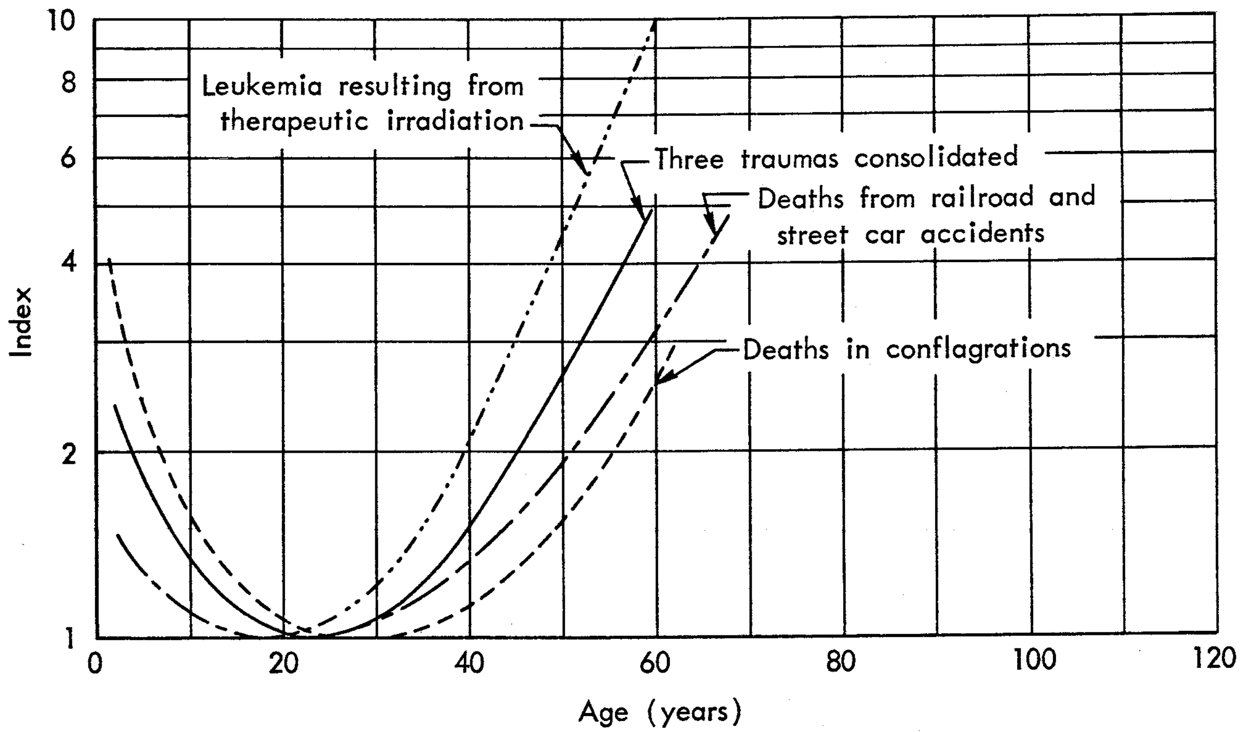

Fig.8—Relative sensitivity to trauma at different ages

Earthquake deaths might make the most suitable proxy for deaths from nuclear blast forces where age-dependence is concerned. The most nearly appropriate data we could find, however, relate to vehicle accidents. The connection is not as farfetched as it may seem. Most of the "blast" deaths anticipated in the event of nuclear attack would occur not through direct action of the overpressures, but indirectly, as a result of people being struck by flying debris, falling walls, etc. Injuries suffered in vehicle accidents are generally produced by comparable mechanisms. Anyway, pending discovery of data relating to a better proxy, these will serve for purposes of our estimates.

Finally, in an attempt to find <u>some</u> well defined indication of age-dependence in human susceptibility to fallout radiation, we adapted a curve from Doll showing only the incidence of leukemia in consequence of radiation therapy.* We cannot be at all sure how good a proxy this curve may be for our purposes. (As Doll pointed out, even the incidence of leukemia among Hiroshima survivors who had been exposed to some prompt ionizing radiations does not seem to show a comparable dependence on age.) But if the age-dependence of susceptibility to fallout is ultimately proven to be anywhere near as distinctive as suggested by the juxtaposed curves of Fig. 8, the value of taking separate account of fallout's influence will be clear.**

We shall conclude this section by drawing upon the data in Fig. 8 to make an illustrative calculation of how nuclear attacks might distort the age distribution of the U.S. population. Before doing so, however, we want to call attention to two indications that our source data may

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*Ibid.

**The Hiroshima experience notwithstanding, there seems virtually certain to be some considerable age-dependence in human sensitivity to fallout radiation. Systematic experimentation has shown young adult mice to be much less sensitive to whole-body radiation than either very young or very old mice. (Cf. Lindop, P. J. and J. Rotblat, "The Age Factor in Radiation Sensitivity in Mice," <u>British Journal of Radiology</u>, January 1962.) And Blair argues that experience with mice is directly translatable to man. (Cf. Blair, H. A., <u>Data Pertaining to Shortening of Life Span by Ionizing Radiation</u>, University of Rochester report UR-442, May 18, 1956.

have distorted the amount of age-dependence, understating it at the lowest ages, and, possibly, overstating it for ages above 30 years.

The understatement arises because the insurance statistics on which two of our three elemental curves are based take no account of deaths occurring during the first year of life, when, of course, vulnerability is generally very high. The possibility of overstatement beyond age 30 was revealed when we confronted an otherwise unused portion of our insurance data with supposedly somewhat comparable data from another source. In the data from that second source, the death rate rose only about two-thirds as fast with advancing age.*

There are thus several reasons for not applying the data presented in Fig. 8 without some adjustments. The leukemia incidence curve is of debatable relevance, and the other two curves should doubtless be raised somewhat at their left ends and possibly lowered a good deal at their right ends. Research in depth will be necessary before the appropriate extent of such adjustments can be established. In the meantime, it will be instructive to show how the U.S. population's age distribution would be altered on the basis of somewhat arbitrary--but quite conservatively so--assumptions about age-dependence.

We shall deal separately with the three age groups for which the County and City Data Book, 1962, explicitly or implicitly provides data: children under 5, adults 65 and over, and the remainder of the population. According to estimates based on Quick Count runs, attack 3-10 would leave about 54 percent of the population of the conterminous 48 states dead, 24 percent at least by prompt effects, and (averaged over our six exemplar winds) an additional 30 percent by fallout. Let us suppose that the death rate for the youngest age group is twice that for people between 5 and

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*In particular, we confronted the data of Dublin and Lotka showing deaths (for females, per 100,000 females in the age group) in consequence of automobile accidents, with deaths as a proportion of deaths and injuries in such accidents (derived from National Safety Council data appearing in Accident Facts, 1962). While the populations are different as to both sex and year, and the series are obviously different definitionally, we had chosen to use the insurance data in the belief that just such a definitional difference was not unduly important.

64 years old, and that the rate for people 65 and over is as much as three times as high as for the 5-64 group. (In the light of Fig. 8 and the qualifications we have expressed, it should be clear that we would expect actual rate differentials to be at least that large.)

Now we could proceed immediately to relate these differentials to the number of people in each age group and to the overall death rate, and thereby to deduce, via elementary algebra, a death rate for each age group. That would be grossly unfair, however. Obviously there would be no age discrimination either within the fireball or for a large distance beyond it. Nor would there be age discrimination where fallout density was overwhelmingly high. We assume age discrimination is negligible for half the people exposed to peak overpressures of more than 6 psi,* and for all people located where the ambient radiation (before allowance for terrain and structural shielding) would integrate to 10,000 roentgens or more during the first two weeks after attack. These last two assumptions would exclude the possibility of age discrimination for about 37 percent of all attack-produced deaths.

We find, then, that the overall death rate of 54 percent for attack 3-10 implies strikingly different death rates for the three component age groups: 47 percent for people 5 to 64 years old (the bulk of the population), 74 percent for those under 5 years, and 87 percent for those 65 and over. According to this calculation, people whose ages at time of attack place them very near either end of the normal life span would have extraordinarily poor chances of survival.

The calculation's validity depends, however, on the correct identification of two critical thresholds, in terms of intensities of attack hazards: an upper threshold, above which everyone would presumably die, and a lower threshold, below which everyone would presumably live. Only in between would deaths be age-dependent.

We have taken an ambient radiation dose, integrated out to two weeks after attack, of 300 roentgens as our lower threshold. Our

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*This assumption is consistent with the Hiroshima experience, where it appears that strong age discrimination occurred over no less than half the area within the 6-psi radius.

upper threshold has been the composite one previously noted. (Half of all people located where overpressures peaked to more than 6 psi, and all people in regions where the ambient radiation integrated to 10,000 roentgens two weeks after attack have been assumed to die regardless of age.) As we have said, these thresholds effectively meant that 37 percent of all fatalities were age-independent. If we now modify the upper threshold so that <u>all</u> people exposed to an ambient 6 psi are counted as dead irrespective of age, the effect is to make about 60 percent of all fatalities age-independent. Redoing our computation on that basis, we find somewhat smaller differentials than before. About 49 percent of people 5 to 64 are killed, 66 percent of those under 5, and 82 percent of those 65 and over.

Results for both sets of thresholds are juxtaposed in Fig. 9.

Unfortunately, we cannot say which of these calculations is the more realistic. The first of them appears to be, but we cannot be sure.* In either case, the indicated disparities are extreme enough so that this seems an area in which further investigation is warranted. A critical aspect of such further work would involve establishing, with respect to each hazard type, quantitative thresholds delimiting the regions within which deaths would be age-dependent, and defining those thresholds in terms convenient for application in nationwide casualty-prediction exercises. A policy question ultimately deserving explicit consideration might be that of how to take account of age-dependence when making assignments of people among shelters of different quality, given anticipations about ambient hazard levels.

SURVIVAL RATES ALSO INCOME-DEPENDENT

While income sensitivity is less pronounced than age sensitivity, our calculations nevertheless reveal a distinct tendency for high-income families--the upper 15 percent of the income distribution--to fare somewhat worse under attack than would the population as a whole. Differences would, to be sure, be almost completely trivial under the three smallest attacks; but where attacks 2-30, 3-10, 4-30, or 5-100 are concerned, families having 1959 incomes of $10,000 or more would

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*See, however, p. 73, especially the footnote there.

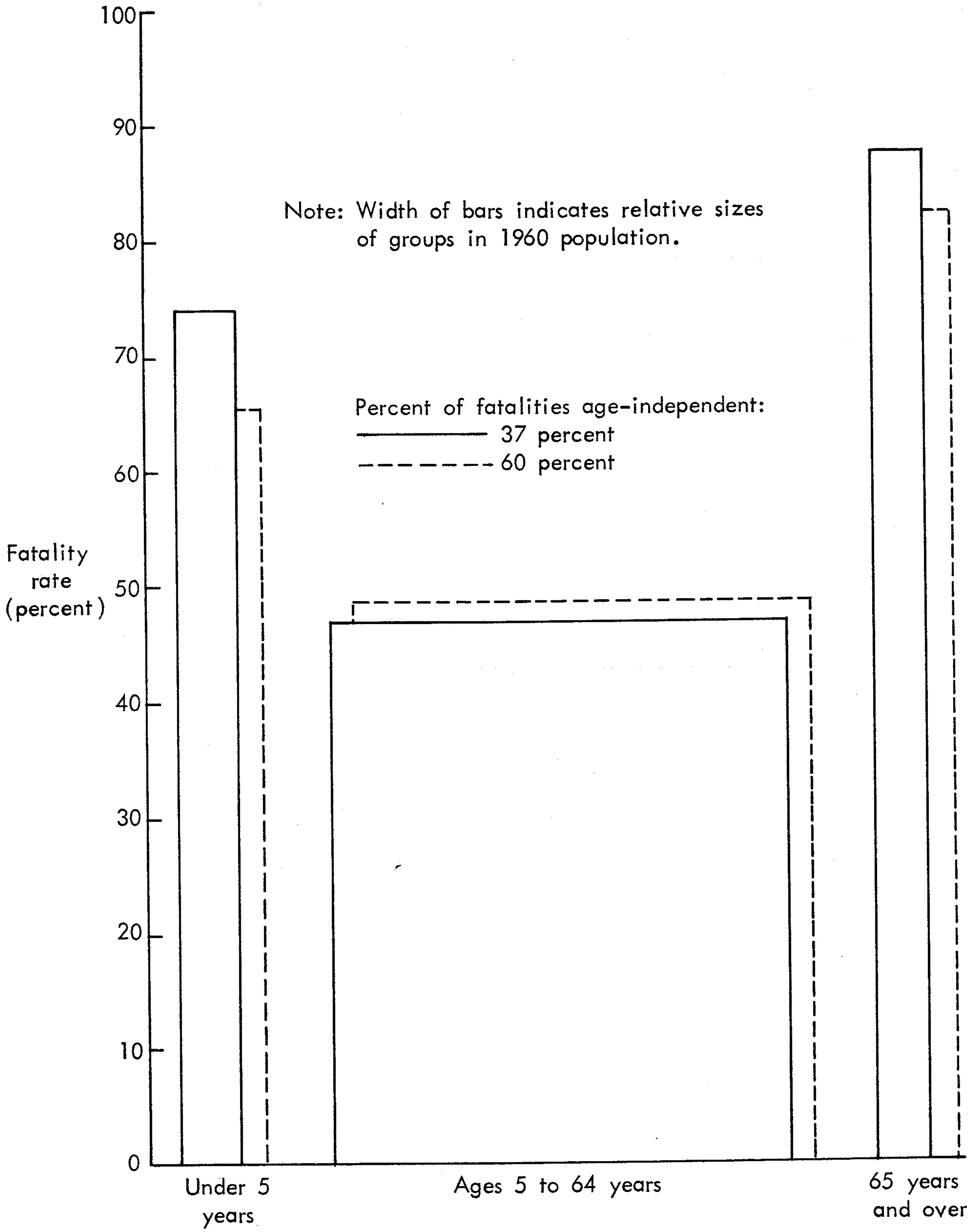

Fig.9—Proportions of the U.S. people killed, by age group (attack 3-10, 6-wind average)

typically survive at rates nationally only 75 percent to 85 percent as high as those for the general population.[*] Regional disparities are occasionally much more pronounced.

The importance of this group is such that differences of these magnitudes cannot safely be ignored. High-income families tend to play, simultaneously, several strategic roles. Ordinarily they <u>have</u> high incomes because society has placed an above-average valuation on the product of the principal worker; because they have high incomes, their conventional standard of living tends to be both above average and somewhat distinctive; and these attributes, taken altogether, are qualifications for leadership. It cannot confidently be said that we can foresee all the ways in which a disproportionately low survival rate for these families--who, though they number only 15 percent of all families, account for the generation and disposition of one-third of all income--would influence the directions toward which postattack society would move. Nor can we begin to say how rapid that movement would be.

It is to be hoped that more detailed studies will be undertaken to identify the affected elements in more dimensions. On the basis of our aggregative work we can only conjecture that, since the great bulk of high-income families are urban, such families are no doubt simply sharing the fate of all urban families.

<u>BROKEN FAMILIES</u>

The macroscopic approach characteristic of most of our study is incapable of providing much information about the casualty rate for families as entities. Our discussion of age-dependence in the susceptibility of individuals to weapon effects stopped short of pointing out the logical consequence with respect to survival of intact families. But, beyond that, there is little that we could have said.

Any exploration of the degree to which members of a family would share a common fate necessitates resort to an essentially different

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[*] Nine-tenths of the 24 nationwide results (4 attacks x 6 winds) to which reference is made fall between 75 and 85 percent.

sort of model. The interaction of weapon effects with individuals identified as being members of particular families requires a microscopic, rather than a macroscopic, approach. The calculus must be different and the data base must be vastly more elaborate than any for which comprehensive national coverage is available. Yet the subject merits attention. Rather than dismiss it entirely, we have elected to throw what little light upon it our resources will permit.

An important part of the problem arises out of the habitual dispersal, during parts of a typical day, of a family's members as they leave home in pursuit of separate interests--work, school, shopping, etc. Some of these missions do not take members very far from home, some others require them to be away only briefly, and still others only infrequently. By and large it is work trips that are responsible for separations that are at once wide, long, and frequent. It is with separations occasioned by work trips that we shall concern ourselves.

Of course, even work trips seldom take people much more than 10 or 15 miles from home, and in an era of megaton-yield weapons there are grounds for suspecting that movements on that scale would have only a marginal effect on survival prospects. If it were certain that fallout would constitute an important hazard, the differences in survival rates arising out of the separations occasioned by work trips might not be worth calculating. But lethal fallout is not a necessary concomitant of nuclear attack. The possibility of airbursts is real, and airbursts would produce negligible fallout locally. Furthermore, the fission yield of a weapon--and hence the lethality of its fallout--depends upon weapon design. Former President Eisenhower announced some years ago that the United States possessed weapons that were more than 90 percent clean.* So there might be negligible radioactivity in fallout even if weapons were surface burst. And, finally, fallout even from "dirty" weapons would be an effective lethal agent only to the extent that the population lacked suitable shelter. There is, thus, a rational basis for examining cases in which fallout plays no role. And, so far as prompt effects are concerned, we can let our analysis inform us as to just how marginal an influence the separations occasioned by work trips might be.

*Cf. N. Y. Times, June 25, 1957.

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The situation with which we shall deal, then, is one in which an attack is delivered when the population is distributed in its usual fashion. This is tantamount to assuming that tactical warning of impending attack is lacking, and that attack was (incorrectly) judged not imminent. In short, we deal with a situation in which people are going about their business pretty much as usual.

As mentioned above, no comprehensive, nationwide data base exists in the detail necessary to support an investigation of the kind that we are undertaking.* So our analysis must be microscopic not only in its level of detail, but also in its field of view. The kind of data we need exists only for a handful of large urban places for which elaborate studies of urban transportation have been made in recent years. The amount of data involved for each such place is huge by comparison with that used in the other parts of our analysis. (Thus, the number of points used to represent the loci of people in one urban area is about ten times as large as the number we have characteristically used to represent the entire population of the United States.) In order to minimize data processing, we have elected to restrict our attention to a single urban place.

The Chicago area is a suitable exemplar for our purposes. It is large enough (third-ranking not only in number of inhabitants but also in areal extent) so that substantial normal daytime dispersal of family members is to be expected. A study of its transportation requirements has produced data of the kind needed and of evident quality. And the accessibility of that data is good.**

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*The 1960 Census of Population asked, in a sample of households, what the principal worktripper's destination was, but the responses were in terms of the name of the establishment to which the worktripper reported. For our purposes, coordinates are necessary, and the interpretive work necessary to deduce coordinates from the information given is far beyond our means.

**Cf. Carroll, J. Douglas (Director), <u>Chicago Area Transportation Study, Final Report, 1959, CATS</u>, under joint sponsorship of the State of Illinois, County of Cook, City of Chicago, and the U.S. Department of Commerce (Bureau of Public Roads).

Tape versions of the Study's data files were earlier made available to The RAND Corporation for its unrestricted use. We have found them invaluable in the investigation being described.

Sampling approximately one in each 30 families, the Chicago Area Transportation Study established that work trips accounted for nearly 40 percent of all trips from home and averaged 5.3 miles in length. One-fourth of such trips went less than 2.3 miles; an equal part went more than 12.5 miles. We shall be evaluating outcomes in which attacking weapons have lethal radii of 3, 6, and 9 statute miles (corresponding, approximately, to yields of 2, 15, and 50 MT if we assume something in the neighborhood of 6 psi is a lethal overpressure). Weapon radii and separation distances resulting from work trips are thus of comparable magnitude, creating the expectation that by no means all families having surviving members would survive intact.

Information about the precise location, at the time of attack, of each member of each family sampled* in the Chicago Area Transportation Study has become an essential input to a computer program that Robert J. Eggleton, of The RAND Corporation, devised to calculate each family's status after attack, and to collect such results into interesting aggregates.**

We have chosen to treat two kinds of attack. One involves a single weapon delivered to the central business district (Chicago's Loop). The other involves three weapons of identical yield, one at each of three arbitrarily chosen suburban locations: Blue Island, Cicero, and O'Hare International Airport. The results obtained are summarized in Fig. 10.

There the top of each bar falls short of 100 percent by the percentage of families that the hypothesized attack would wipe out completely. Each bar, then, accounts (over its entire length) only for families having one or more surviving members. The uppermost segment

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*The Chicago Area Transportation Study sampled dwellings, rather than families, but the correspondence is presumably close and we have equated the two.

**Each member of a family was treated as being either at home or at work (as appropriate). A member was counted as surviving if his location at the assumed time of attack was not within one lethal radius of any stipulated weapon. The head of family's identity was retained, and his fate recorded separately.

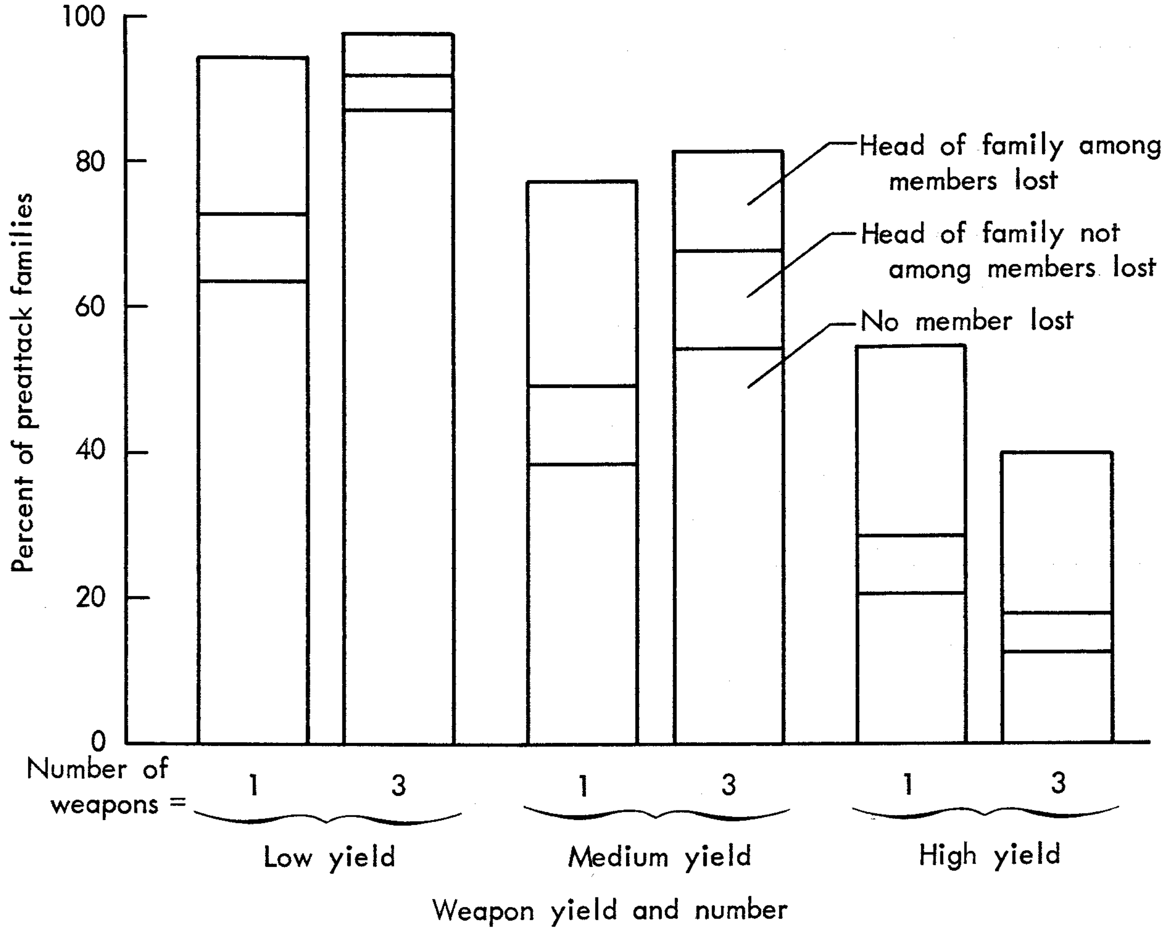

Fig. 10—Degree of survival among Chicago families

of a bar indicates, by its length, the percentage of preattack families that would survive in some part but without the family head. The middle segment's length indicates what percent of Chicago's preattack families would lose some member other than the family head. And the lowest segment indicates what percent of Chicago's families would survive intact.

In other words, families might be wiped out completely (space above the top of each bar), survive intact (lowest segment of each bar), or survive only in part (in which case there is enough interest in knowing which part so that the remaining two bar segments are needed to chart the answer).

As Fig. 10 plainly shows, broken families would be numerous under the circumstances specified--appallingly so in the cases of the heaviest attacks. Moreover, no more than one-fifth of all preattack families would be entirely intact after an attack with the highest yield weapon.

Such figures are less meaningful in the abstract than when related to survival rates as they would conventionally be computed--i.e., for individuals at their residential (night) locations. For example, with a single low-yield weapon delivered to Chicago's Loop, 91 percent of all individuals would be estimated to survive if physical vulnerability assumptions matched those used in our family calculations. But Fig. 10 shows that the number of families surviving intact would be only 63 percent of the preattack total. Some such difference in survival rates between individuals and intact families is to be expected. The ratio between them may in any instance be larger or smaller than the example cited. But because survival rates are never calculated for families as entities, we can all too readily lose sight of how very destructive of the social fabric nuclear attack could be.

Substantial differences between survival rates for the entities with respect to which calculations are usually made and some entities of at least comparable importance have in this instance arisen because we are considering what is probably not the most likely contingency. But it is not an altogether improbable one either, and a more complete comparison of these survival rates may therefore be worthwhile. Such a comparison is available in Table 4.

Table 4

SURVIVAL RATES FOR INDIVIDUALS (NIGHT AND DAY DISTRIBUTION)
AND COMPARABLE RATES FOR SURVIVAL OF INTACT FAMILIES

Exemplar city: Chicago

Entity \ Weapon Yield and Number	Low Yield		Medium Yield		High Yield	
	1	3	1	3	1	3
Individuals, Night Distribution	91%	92%	67%	59%	41%	23%
Individuals, Day Distribution	81	91	57	62	34	19
Families Intact, Day Distribution	63	87	38	54	20	12

NOTE: Survival rates are sometimes higher when three weapons are used than when one weapon of the same yield is used because ground zeros for the three weapons are in the suburbs and population densities thereabouts are relatively low. The highest yield weapons have sufficient reach to give at least partial coverage of high population-density areas.

We have not at this point exhausted the potential, for our purposes, of the data generated by the Chicago Area Transportation Study. That data enables us not only to explore survival in terms of families, but to do this separately for families with various characteristics. In particular, we are enabled to evaluate hypotheses about how income level--or, more generally, level of affluence--would influence the proportion of families surviving intact.

It is widely appreciated that the distance people are willing to travel in order to get to work depends on the benefits obtained. People who regard their place of residence as fixed will undertake to travel farther to work if there is some incentive in terms of pay or working conditions. Similarly, people who are well-established in jobs may bear the expense and inconvenience of long work trips in order to obtain preferred living conditions. And, of course, the same influences are at work when people find themselves selecting both job and residence at one time. Furthermore, it appears that people are much more flexible about the distance they are willing to travel than about the time it takes. Therefore, any ability to afford faster transportation (e.g., automobiles rather than buses, etc.) tends to show up in increased work trip length. We can expect, therefore, that families living in more advantageous dwellings, families well equipped with cars, and families in which the principal earner is well paid will be more widely dispersed during the normal work week, and hence are more liable to be broken in the event of attack.

The influences of wage levels and of other indications of affluence on work trip distance in the Chicago area are shown in Table 5. There, worktrippers have been grouped by industrial affiliation. The average annual wage is given for each industry, as is (in the adjacent column) average distance traveled to work. While the highest-paid workers (those in construction) certainly undertake the longest work trips on the average and the lowest-paid workers (those in retail trade) undertake the shortest, the range of average wages is evidently not large enough to produce very important differences in work trip lengths. In fact, four or five of the categories have essentially the same average wage and the associated work trips are insignificantly different from one another from our point of view.

Table 5

JOB STATUS, LEVEL OF AFFLUENCE, AND WORK TRIP LENGTH
(Chicago)

Activity (Industrial Affiliation)	Annual Wage	Work Trip Character			
		Mean Distance Traveled	Percent of Trips More Than 8 Miles		
			All Families	Type S Families[a]	Type M Families[b]
Construction	$6300	6.6 mi	31%	35%	27%
Public administration	5100	5.8	24	37	17
Nondurables mfg.	5100	5.4	22	45	11
Durables mfg.	5100	5.0	19	31	12
Finance, insurance, and real estate	4900	5.5	28	44	18
Not elsewhere classified	4600	5.6	25	42	16
Retail trade	3700	4.3	16	26	11
All activities	4800	5.3	22	37	14

[a]Families living in single family dwellings and having at least one car.

[b]Families neither living in single family dwellings nor having more than one car.

Source: Chicago Area Transportation Study

But, as can be seen by reference to the right-hand columns of the same table, other characteristics are more influential. Worktrippers who are members of families affluent enough to live in single family dwellings and to have at least one car are apt to work far from home--far enough to affect prospects for their families surviving as entities in the event of attack. Their less affluent associates tend to live closer to their work places.

Just how influential this latter distinction might be for the survival of families as entities may be judged from Fig. 11, which contrasts survival rates for (1) families living in single family dwellings and owning at least one car (Type S), and (2) families neither living in single family dwellings nor owning more than one car (Type M). This figure is similar in all essentials to the preceding figure. What is different is mainly the level of aggregation. The same data are merely being re-summarized, with attention now focused on the Type S and Type M components only. (Omitted components account for fewer than one-tenth of all work trips.)

Looking first at the upper half of Fig. 11, which relates to a single weapon delivered on Chicago's Loop, we see progressively more striking differences between survival rates for the two categories as weapon yield is increased, until, finally, about 40 percent of Type S families survive intact while only 11 percent of Type M families do. Undoubtedly, family breakage here typically results from death of working members (who travel inward toward the Loop and their jobs) while nonworking family members remain at home. In the case of the more affluent families, home is in the suburbs and hence well away from ground zero. When weapons are delivered to ground zeros scattered about the city, no such disparity is to be expected, and, as can be seen by reference to the lower half of Fig. 11, there is even a slight reversal under the stipulated attack.

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It must be amply evident from consideration of just the few additional dimensions in terms of which we have so far described attack outcomes that a dichotomous view of the postattack situation is more than a slight distortion of what could be expected. If there is an "A"

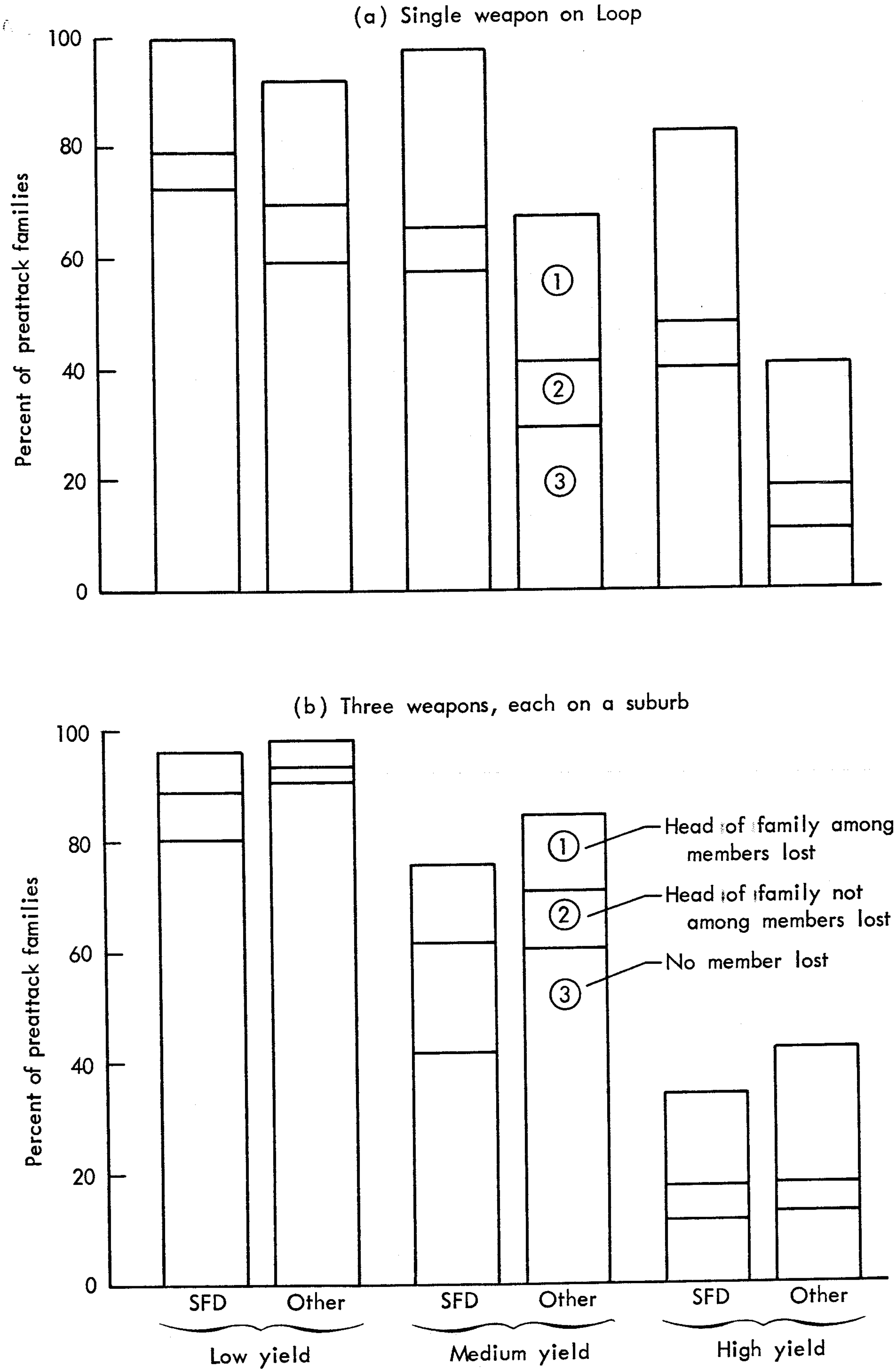

Fig. 11—Degree of survival among Chicago families, by indicated level of affluence

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country that can be said to contain all the damage and a "B" country that can be said to contain none, it must also be acknowledged that those two countries are distinct entities in few meaningful senses. We have already seen that while the boundary between the "A" and "B" countries may very well tend to separate urban people from farm people, it does so only imperfectly. We have also seen that the boundary tends to partition one income group from another, age groups from one another, and even family members from one another. In the next section we shall see further examples of the special nature of the boundary between the two "countries."

But it must already be quite evident that the nation's damaged parts would not be geographically separate from its undamaged parts. Material damage, injuries, and deaths would not be off somewhere out of sight of the survivors. Their presence would typically be of the most immediate sort--to be seen and felt for a long time by all those who survived.

So the view we now have before us of an attack's aftermath is a somber one. What apparently could be expected is a fairly drastic reduction in the proportions of the populace at the very young or very old extremes of the age distribution. Such a change is of interest not merely from the standpoint of individuals, but also from the standpoint of families. The tragedy involved in a family's loss of its young children and aged grandparents is in any case hard to appreciate; what it would mean when replicated a few million times all over the nation, we cannot say.

But it is evident that the postattack situation in general might be anything but conducive to normal family life as we know it. What this would imply for population regeneration is a matter for demographers to explore.* There are, however, historic examples of the responses of

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*The hazard tabulations developed for use here were made available concurrently to a demographer, I. S. Lowry, so that he could model the differential influence of varied attacks on population regeneration. His Memorandum also takes account of the problem of age-dependent mortality, doing so by reference to Hiroshima experience.

Cf. Lowry, Ira S., The Postattack Population of the United States, The RAND Corporation, RM-5115-TAB, December 1966.

Compare Heer, David M., op. cit.

peoples to stresses that are at least remotely comparable. We can look, for example, to the experience of the Soviet Union during the decade or two centered on World War II. At the beginning of 1950, the USSR's population was smaller by 20 million than it had been when German invasion began 8½ years earlier. Yet, by the 1959 census, the Soviet population had achieved a substantial recovery. In fact, it was 10 percent larger than it had been when censused in 1939. Nevertheless, one age group, that of 10- to 15-year olds, was 40 percent smaller than at the earlier date. Some of this shortfall may be attributable to a temporary increase in infant mortality, but the principal explanation seems to be that births in the years near war's end (1944-1949) were very much fewer than usual.*

That the birth rate should have been extraordinarily low seems natural enough from what we know of circumstances. Family members had in many cases been separated from one another by death or by distance, the nation was impoverished by destruction of its housing and by wastage of its productive capital, and there was disruption at every hand. Taken altogether, these factors tended to make life in the near term difficult and to leave prospects for the future considerably dimmed.

Since it is well established that birth rates (and family formations as well) are characteristically depressed whenever such conditions prevail,** and since nuclear attacks would apparently produce at least comparable devastation, there is some basis for suspecting that extraordinarily low crude birth rates would obtain in the early years after nuclear attack. Nevertheless, nuclear war as we envision it is different enough from any past experience so that this conclusion cannot yet be regarded as established.

We may note, however, that one hazard peculiar to nuclear warfare (residual radiation) constitutes an additional factor capable of influencing the decisions of surviving families with respect to having

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*Cf., e.g., Brackett, James W., op. cit., pp. 510, 520, 537.

**A number of historical experiences reflecting a tendency to postpone child bearing and even family formation until more favorable times are summarized in Angell, Sir Norman, et al., <u>What Would be the Character of a New War</u>, Victor Gollancz, Ltd., London, 1933. See Chap. VII.

further children. It is quite possible that such families would be inclined to wait until the hazard had all but vanished.

In any event, we have seen evidence that the number of intact families would be smaller (possibly very much smaller relative to the number of individuals surviving) than before. This alone is reason enough to expect at least a temporary reduction in the birth rate.

Any reluctance to have children would, of course, tend to aggravate whatever distortion of the age distribution was originally produced by differing susceptibility to direct weapon effects. A three-year deferment of new births would mean that a depleted 0-4 year age group would be stretched to a 0-7 year group. On the other hand, the initial depletion of the 65-and-over age group would tend to disappear with each passing year, slowed a little, perhaps, by the likelihood that anyone living during the first year or so after the war would have been subjected to stresses tending, like many more familiar stresses, to shorten life.

V. EFFECTS ON THE ECONOMY

ATTACK OUTCOMES IN TERMS OF ECONOMIC ENTITIES

Broad National Aggregates

Disparities in survival among the economic entities for which we have made measurements are comparable in magnitude and incidence to those we have already discussed with respect to people. They merit careful attention, however, because it is mainly through examining them that we develop such appreciation as is possible of the obstacles to postattack recuperation; and, in the end, it will only be by using these economic entities--or some akin to them--that we can hope to test our notions about the prospects for economic regeneration.

There is at least a terminological difficulty connected with presentation and discussion of survival for economic entities. We are interested in what nuclear attacks portend with respect to such diverse items as, among others, farmland, livestock sales, demand deposits, construction workers, and value added by manufacturing. That is, we want to ascertain whether there is a sense in which nuclear attacks discriminate among these "populations"--whether the parts of the nation and of its component regions that are spared are disproportionately those which have been specializing in general farming, or livestock marketing, or finance, or new construction activity, or manufacturing, or whatever.

To that end, we have identified cities and counties throughout the nation in which the hazards experienced (i.e., calculated) are less than certain reference levels.* Already associated with each of these cities and counties is a value specifying how large some selected economic entity bulks locally. By summing the local values for this entity over the appropriate counties, we obtain an aggregate value for each region and another for the nation as a whole. We then convert to

*The particular levels used are some having significance as thresholds for the survival of people.

percentage terms (dividing by the corresponding preattack totals). For brevity, we refer to these results as "percentages surviving." For example, we shall speak of the percentage of "manufacturing value added" surviving, meaning only that the indicated proportion of preattack MVA is in areas where hazards are light enough so that people (including the industry's workers) could be expected to survive.*

As was to be expected, calculations relating to economic entities reveal the usual strong dependence on total megatonnage delivered, survival rates typically being lower for the heavier attacks. This dependence is overridden only when extraordinary differences in attack type are involved. In accordance with the pattern generally apparent in our results, it is only target system 1 (emphasizing missile launch facilities and similarly isolated targets) which is distinctive enough so that such an override occurs.

Figure 12 shows the influence of attack weight and type on survival for certain broad economic entities. Attacks are arranged as before--i.e., in order of megatonnage delivered. Most observations prompted by the data plotted apply with about equal force regardless of whether we limit our attention to results averaged over alternative wind conditions (Fig. 12(a)), or look at those deriving from winds for one particular day or another (Fig. 12(b)).

In addition to the almost monotone dependence on attack weight, Fig. 12 reveals further examples of the tendency for farm elements to fare better than urban ones. We can find occasional factors of one and one-half or two favoring survival of farm sales in the lighter attacks; factors of two or more sometimes result from the heavier ones.

Again in this connection, attack 1-30 displays its unique influence. Not only are the survival disparities it produces among these four economic entities modest by comparison with those consequent upon the other heavy attacks, but the average outcome graphed in Fig. 12(b)

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*The data we shall cite should therefore not be construed as survival rates for capital facilities. Higher survival rates would be appropriate for physical plant, which is of course left undamaged by fallout. That is, such plant would survive in some degree even where no local inhabitants survived to reactivate it.

Note:

First digit in attack identification number identifies a target system; the remaining digits identify a modal weapon yield (megatons) used in the attack.

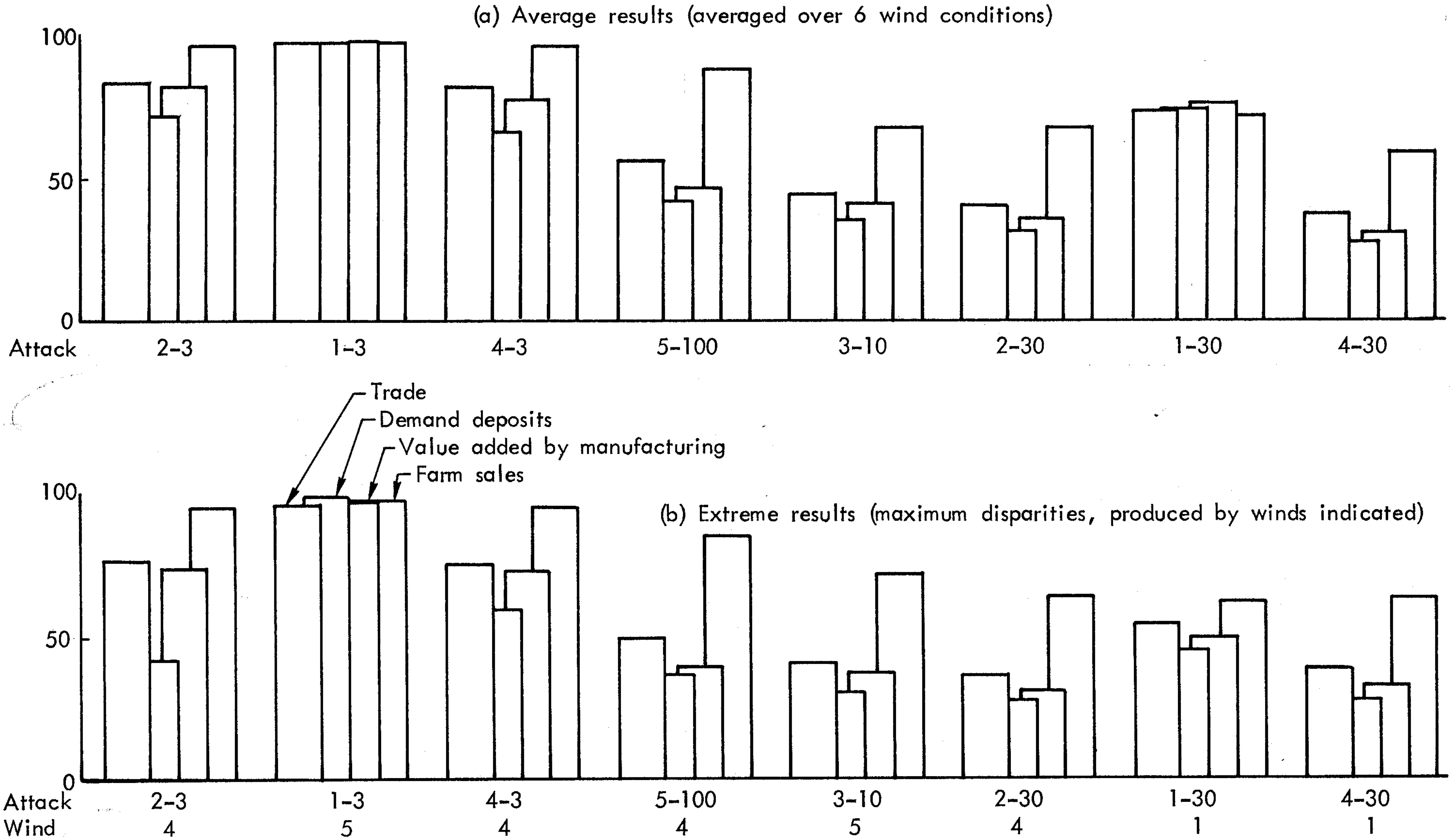

Fig. 12—Differential survival for selected economic entities, eight attacks

is unlike the particular one selected for display there. Had we looked at average outcomes alone, we could only have said that survival differences among the four subject items are almost negligible, while noting that, peculiarly in this case, such small differences as are visible favor urban entities over the rural one. But, looking at the extreme results found among those produced by alternative wind conditions, we see quite a different picture: the item "farm sales" fares better--and distinctly so--than "trade, demand deposits, or MVA." This is an instance in which deliberate selection of a case because it involved the greatest spread of outcomes produced by an attack resulted in rejection of every case bearing any family resemblance to the average one. The anomalous case graphed owes its character to the fact that high-velocity winds were present to carry fallout generated by detonations in the Great Plains to the southeast, at first, and then northeast, until it was deposited successively in a number of major metropolises, including several along the Eastern Seaboard between Washington, D.C. and Boston--all while the radioactivity still constituted a potent hazard. Despite this notable exception, results for these four nationwide aggregates are not generally very different as between one day's winds and another's; for once there seems to be only small risk in relying on the averages.

Thus far in this section we have merely been establishing that relationships noted earlier in other connections apply also with respect to some gross economic entities. Only the context has been different. Viewed in our terms, gross economic entities clearly respond to attack variables in much the same way as do demographic ones at comparable levels of aggregation. Let us now concern ourselves with lesser aggregates.

The figure to which we have been referring (Fig. 12) permits us to make a beginning at this. There, outcomes are shown separately for each of three urban aggregates: value added by manufacture (MVA), demand deposits, and wholesale and retail trade. The facts that all three are urban entities, and that they are also fairly ubiquitous ones, should result in their survival rates being highly correlated. The results plotted in Fig. 12 indicate the extent to which such a judgment is correct.

Disparities among these entities are much more modest than among the previous ones. There is no irresistible tendency for one to fare better than the others, although trade frequently fares best and demand deposits worst. We conjecture that MVA suffers relative to trade mainly because its geographic distribution is locally less diffuse, so each additional weapon can affect a significant proportion of the national total. The fact that this disparity is largest where high-yield weapons are directed at the centers of major urban agglomerations (attacks 5-100 and 4-30) supports our conjecture. The same reasoning doubtless applies to demand deposits, although the concentration of banking in Manhattan is an additional factor of some importance when New York is targeted.

Evidently, however, we should expect only exceptionally to encounter large disparities between urban economic entities at a level of aggregation such as that to which Fig. 12 relates. But we cannot yet view this finding with enough confidence to justify basing operational decisions on it--such as, for example, that one of the three items (MVA, say) can safely be used to indicate what happens to each component of the urban economy. Before doing that we ought at least to exploit data at hand to make sure that we have a proper appreciation of the potential for survival disparities.

Lesser Nationwide Aggregates

Availability of a Census Bureau breakdown of the national labor force according to industrial affiliation affords us an opportunity to examine some lesser survival aggregates while at the same time gaining a comprehensive view of survival throughout the entire economy.*

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*No comparable breakdown has, to our knowledge, been available before. Certain sectors, most notably manufacturing, have long since been examined in great detail, but studies dealing intensively with survival in one part of the spectrum of economic activity have done so at the expense of neglecting some other sizeable parts entirely. Our charts omit only a "not elsewhere classified" item, which is available as a residual in the detailed tabulations (Appendix B).

One establishment, the National Resource Evaluation Center, has had the capability of displaying results for a complete breakdown of the economy by industrial affiliation, but not the capability of computing them directly. Cf. the description of the "Manpower" program in Analytical Program Compendium, NREC Technical Manual No. 119 (Revised), December 1964.

Survival rates based on these data are shown in Fig. 13 for each of our five heavy attacks. (We shall omit treatment of the three light attacks here. Patterns of survival differentials for them tend to be similar, but, as is to be expected with the levels of damage generally much smaller, are relatively compressed.) The presence of a bar depicting the survival rate for farm workers serves to remind us of the extent to which rural populations tend to come off best.*

The patterns of attack outcomes are graphed in pairs in order to keep clutter within bounds. Thus, part (a) of Fig. 13 shows results of attacks 2-30 and 4-30, while part (b) shows those for attacks 5-100 and 3-10. Several characteristics merit attention.

First, we see that while survival of the various urban components of the labor force is somewhat uneven, disparities are nevertheless small by comparison with those between any urban entity and the rural one. But because of the variability of outcomes with differences in assumed fallout winds, we cannot confidently judge from this chart just how large the disparities really are. It all depends on how highly correlated outcomes for the several populations may be. We shall have to return to this point with more information in hand.

Meanwhile, we can note that the survival differentials shown in parts (a) and (b) of Fig. 13 are not much influenced by differences in attack design. The general level of survival is affected substantially, but not the pattern of disparities. Workers affiliated with construction, wholesale and retail trade, and education characteristically fare a little better than the urban average, while those affiliated with finance, insurance, and real estate and with public administration tend to fare worse.

That these latter two categories come off relatively badly in the national aggregates is due to these industries being concentrated in, respectively, New York City and Washington, D.C. Whatever the targeting principles being applied, it is easy to find at least one point within each of these cities that merits a weapon assignment. Even if

*Once again we assume equal protection for rural and urban populations.

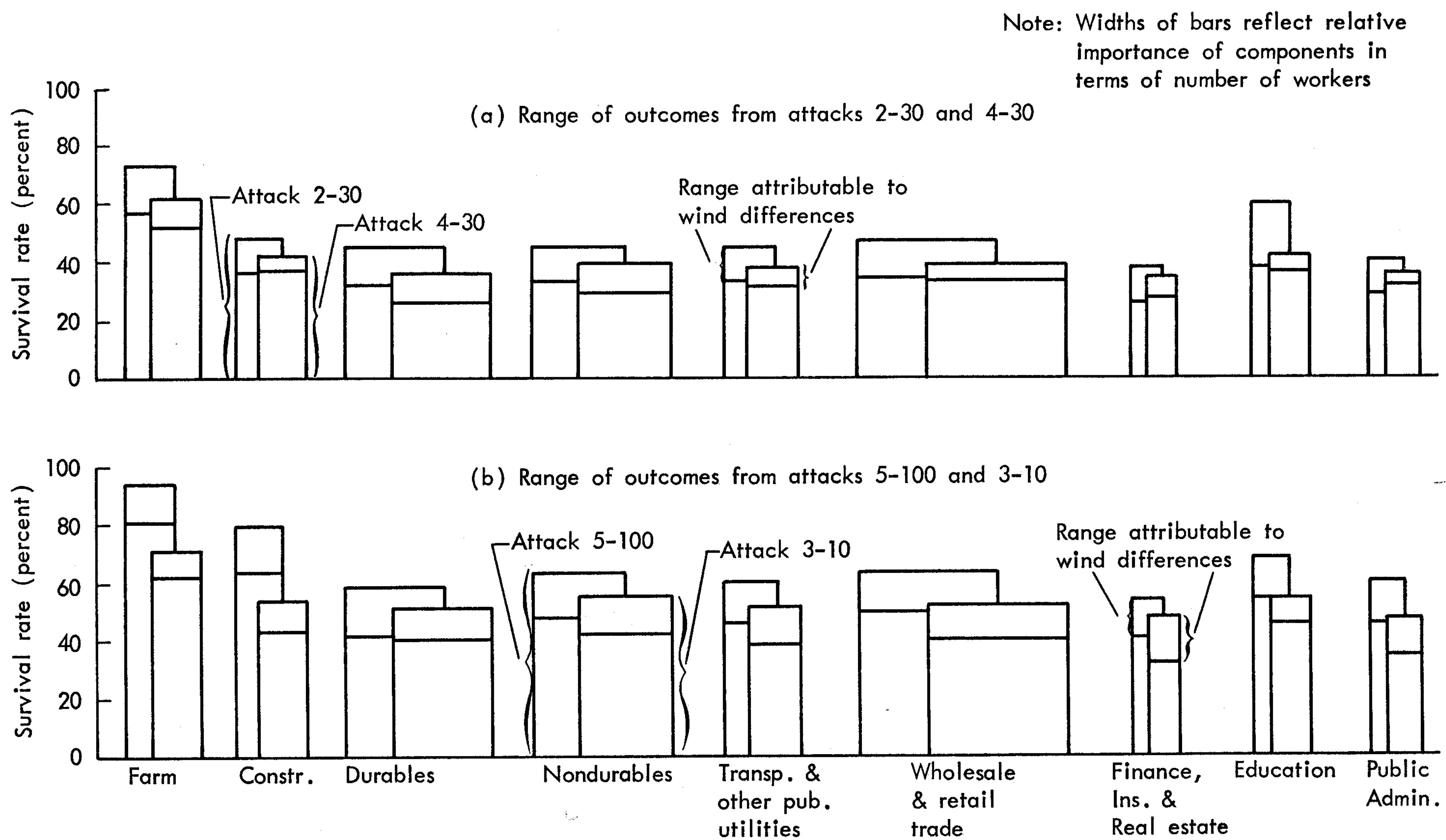

Fig. 13—Differential survival for national components of the labor force

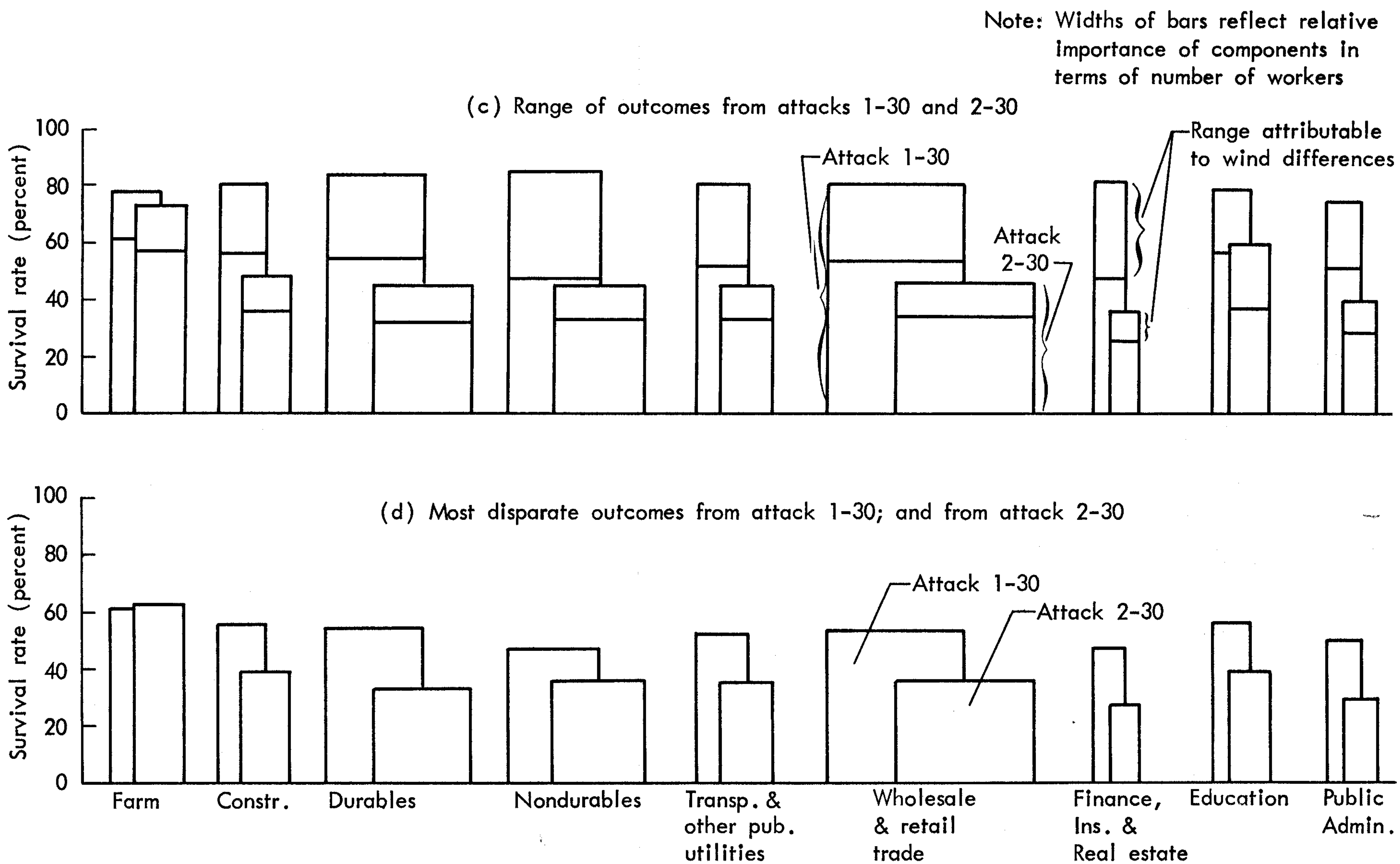

Fig. 13 (concluded)—Differential survival for national components of the labor force

an attacker eschewed striking either city directly, lethal fallout from weapons detonated elsewhere might accomplish an equivalent result so far as the inhabitants of these cities are concerned.

Once again, response to attack 1-30 is exceptional. Only when wind conditions are like those of December 15, 1951, carrying lethal fallout from remote regions to the Eastern Seaboard, does the survival pattern conform to what we are finding to be the norm. Otherwise the pattern tends to be that suggested by part (c) of Fig. 13, and one component of the labor force seems to have about as good a chance as another--workers affiliated with agriculture not excepted.

Another peculiarity of the results for attack 1-30 deserves attention: the extraordinarily large variations in survival depending on which wind condition prevails. The maximum survival rate calculated for this attack exceeds the minimum one by factors ranging, over the various populations, from 1.3 to 1.8. This is, of course, one more indication of the enormous wind-dependence revealed in our calculations. But it is more than that; it concerns us at this point because, depending on how highly correlated survival rates among labor force components are, it might be obscuring some unusual disparities that would become apparent if we examined results wind-by-wind.

Therefore, we have sorted out attack 1-30's outcomes for individual winds, and graphed, in part (d) of Fig. 13, the set of survival rates having the maximum spread among the six calculated. The display there is reassuring. While survival of the labor force components is not quite what would be expected after study of Fig. 13(c), disparities among the urban populations are comparable in magnitude to those we have been viewing all along.

In fact, from this and similar exercises, it is apparent that while extreme disparities among survival rates for national labor force components may somewhat exceed a factor of two when farm workers are compared with others, the factor has always proved to be less than one and one-half <u>when one urban component is compared with another</u>--even in the case of attacks 2-30, 3-10, and 4-30, which produce very low survival rates (and, with them, the chance for large disparities).

An extreme pattern of survival differentials for one of these attacks, 2-30, is included in Fig. 13(d) for purposes of comparison..

What we have found, then, is that segmenting the nation's labor force along lines of industrial affiliation reveals substantial disparities (factors of one and one-half to two, or so) to be a frequent occurrence between farm workers on the one hand and urban workers on the other, but that survival rates for the various urban elements generally differ by less than a factor of one and one-half. These statements reflect detailed scrutiny of our large attacks. Our small attacks typically result in lesser disparities. There is no instance among them where survival of any one component, as computed, exceeds that of another by as much as a factor of one and one-half, and factors are typically much less than that.* If larger disparities are to be found it must be in conjunction with lesser aggregates--regional values, for example.

Regional Aggregates of Labor Force Components

Regional aggregates of these same labor force components reveal disparities that are sometimes large and sometimes small, depending on the region examined. But, always, it is the heavier attacks that produce the greater number of sizeable disparities. After considering the data already presented, it need hardly be mentioned that ratios between the survival rates for farm and nonfarm components of the labor force frequently exceed one and one-half. But when we compare survival rates as between one urban component and another, ratios that large are rather exceptional.

Urban-versus-urban ratios as large as one and one-half are quite rare within five of the nation's eight regions. If they occur at all within those regions it is apt to be in connection with attacks 2-30 or 4-30. Only in California, the Northeast, and the Southeast can

*There is, of course, some reference level of attack hazards (reflecting different assumptions about vulnerability) that would result in factors exceeding one and one-half, but such a level would have to be lower than is appropriate given the protection that is even now available to the populace.

large ratios be said to be fairly frequent, and in each case we find a systematic tendency (though not the same one for all three).

Thus in the Northeast we find that factors exceeding one and one-half separate the survival rate of one urban component from that of another only because New York City contains such a disproportionate number of workers in finance, insurance, and real estate. Because the New York area is invariably subjected to some degree of hazard in our attacks, this group inevitably is discriminated against.

Much the same thing is true in the Southeast, where, however, Washington, D.C. and its government workers substitute in the argument for New York City and financial workers.

In California it is the work force affiliated with durables manufacturing which suffers disproportionately, and produces all instances of large disparities. Here the explanation is a subtler one, stemming from the coincidental location of durables manufacturing in cities downwind from targeted installations, but it is not reducible to such simple terms as was possible for the other two regions.*

Some examples of extreme intraregional disparities are shown in Fig. 14, one part of which is devoted to each of the three regions in which we have found attack-produced imbalances to be frequent. By now most of the qualities of the patterns depicted will be familiar. The main point of the chart is to provide a visual impression of what extreme disparities are like within a region. To some extent such a chart may be a little misleading. Consider the results shown for California, for example. It is easy to come away with the impression that, with the exception of workers affiliated with agriculture and with durables manufacture, survival rates are very similar. Yet, closer inspection reveals that the rate for workers in transportation, etc. is almost one-third higher than that for workers in nondurables. A disparity that size would have been much more conspicuous in another context. This points up how large the other imbalances shown in Fig. 14 really are.

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*The disparity is partly the result of damage due to prompt effects, but is amplified considerably by fallout.

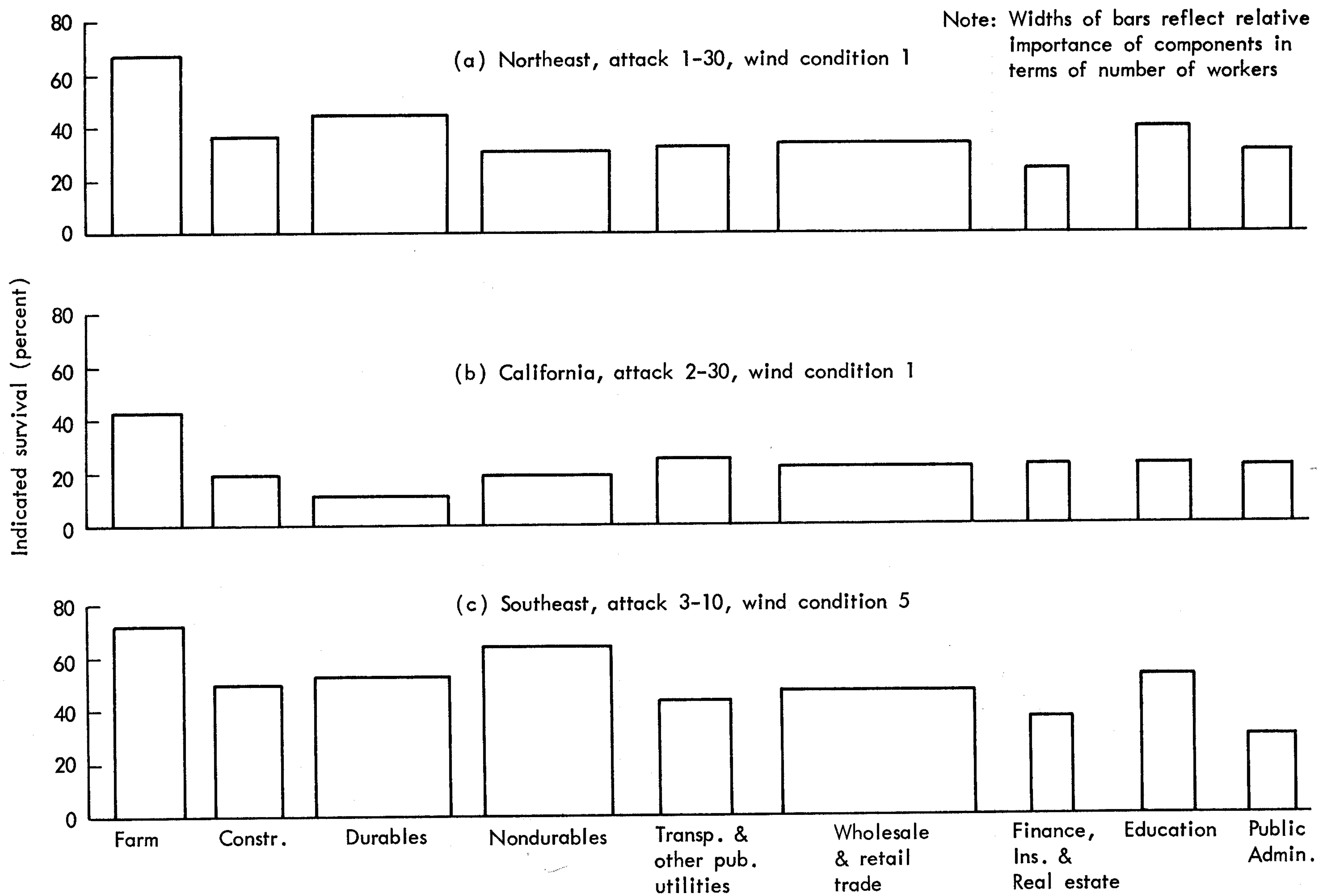

Fig. 14—Examples of extreme survival differentials

Disparities Within the Farm Sector

Really large survival disparities apparently are not to be expected among nationwide aggregates of such farm entities as: number of persons employed in agriculture; value of all farm products sold; value of crops (or dairy products, or poultry, or livestock) sold; and commercial fertilizer used. Our calculations show survival rates (in the sense defined at the beginning of this section) for all these populations to be rather similar at the national level. We have found that the rate for any one of them only infrequently exceeds that for another by a factor larger than 1.15, that factors larger than 1.3 are rare, and larger than 1.5 virtually nonexistent.

The survival rates for regional aggregates of these same farm entities are of course somewhat more variable. As always, it is the heavier attacks that tend to produce the more substantial disparities. For these attacks, survival rates for certain of the entities are frequently separated from others by factors of one and one-half or two, but the larger factors are confined to California and the Northeast. There, as in most regions, it is sales of dairy products, poultry, and livestock that are discriminated against. Areas specializing in crop sales tend to fare better, although not in the Northwest.

In the central regions, survival tends to be more nearly uniform. Intraregional disparities there seldom amount to more than a factor of one and one-half. As elsewhere, dairying and poultry raising suffer relative to other sectors.

Examples of extreme farm disparities are shown in Fig. 15 for the Northeast and West North Central regions, while Fig. 16 displays such examples for California. Included, along with survival rates for the populations already identified, are the corresponding values for farmland (for which "survival" has been computed on the basis of the same hazard reference values used throughout the charts now under discussion, as well as in those discussed previously).

The main purpose of these charts is, of course, to provide some feeling for how very un-uniform survival rates can be in particular instances even when the general tendency is for disparities to be

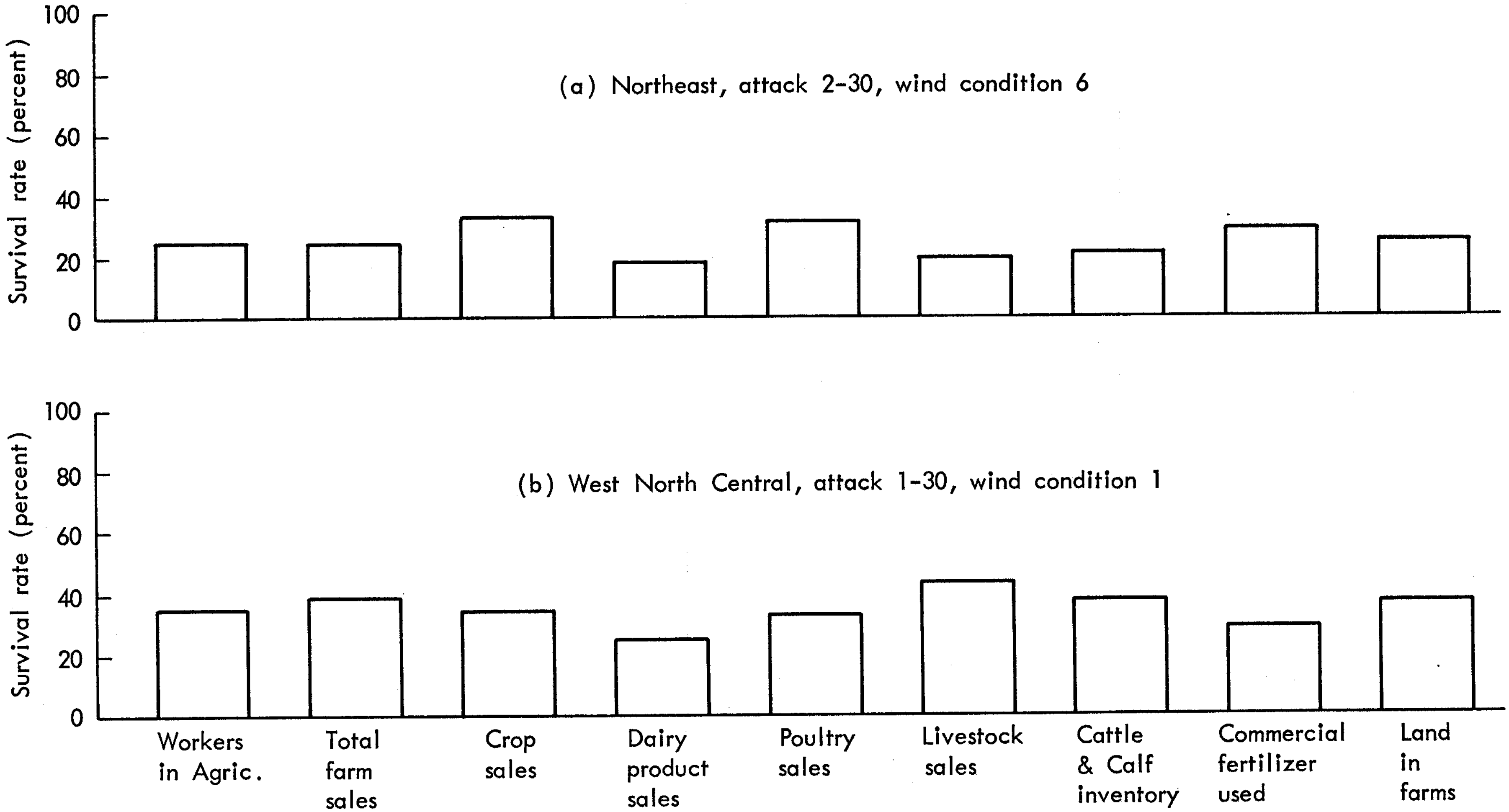

Fig. 15—Examples of extreme survival differentials among farm entities

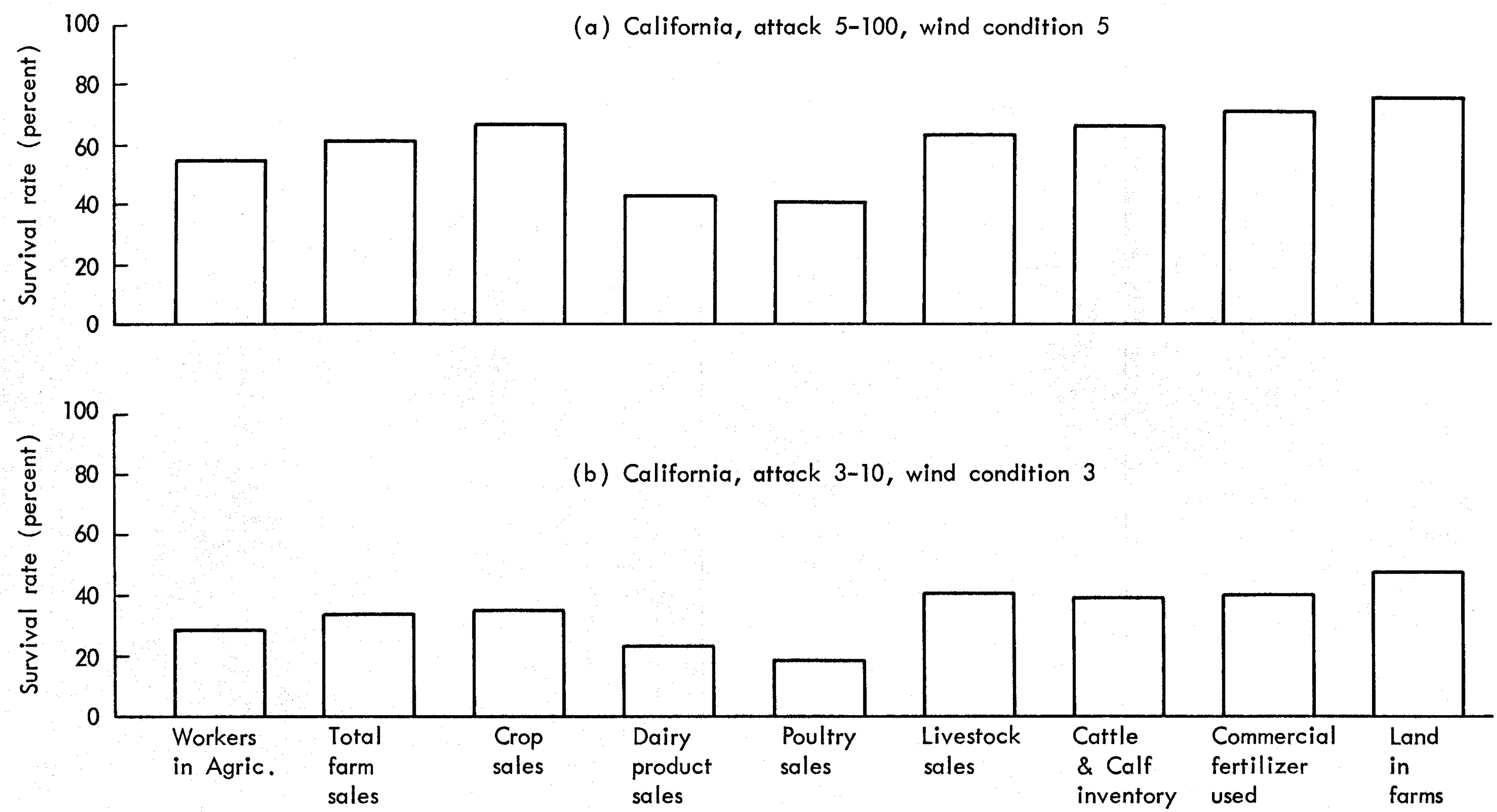

Fig. 16—Examples of extreme survival differentials among farm entities

small. Also apparent from these charts is the fact that it is not invariably the same entities that fare well. The four survival patterns shown in Figs. 15 and 16 are quite different from one another. And "poultry sales," which tends to suffer disproportionately in more typical instances, fares relatively well in the instance depicted by Fig. 15(a).

On another point, the virtue of viewing more than one indicator before drawing any conclusions about the fate of as substantial a part of the economy as agriculture is documented by these charts. Consider, for example, the experience of California as represented in Fig. 16(a). Had we relied exclusively on farmland survival--i.e., on the proportion of farmland in which ambient hazards would be sublethal for the labor force--we might have concluded that about 76 percent of California's farm capacity would survive attack 5-100 under the assumed wind condition.

But farmland is not homogeneous. A disproportionate part of California's farming is carried on in that 76 percent of the state's farmland. As a result, only 55 percent of the total farm labor force would survive. Furthermore, certain farm activities--notably dairying and poultry raising--are in large part carried on in the vicinities of large cities. Since, in the instance under discussion, a 100-MT weapon is delivered to each of California's three largest urbanized areas, we should expect relatively heavy losses in those activities. And such is the case. Our calculations yield survival rates of only 42 percent or 43 percent for them--which is a far cry from the 76 percent rate observed with respect to farmland. Clearly the additional detail is illuminating.

. . .

We have now surveyed possible outcomes of a broad spectrum of nuclear attacks in terms of some important economic entities, and noted how these entities respond, relative to one another, to the attack variables used. It is time to say what we can about the significance for a postattack economy of the survival patterns that are now in evidence.

IMPLICATIONS FOR ECONOMIC VIABILITY

Introduction

The level of production to which each sector of the postattack economy could initially recuperate is, of course, directly dependent not only on survival of a suitable labor force, but also on the availability of capital facilities, and on flows of raw materials and energy. Indirectly, it is dependent on the entire social milieu. Thus the inclination we have displayed to equate labor force survival within a sector with survival of that sector's capacity* is not based on any necessary correspondence between the two; it derives, rather, from a conviction that, by and large, they are highly correlated.

That they _are_ highly correlated does not depend on there being some closely consistent relationship between damage to labor on the one hand, and to capital, which is the second principal determinant of capacity, on the other. Damage to these two factors does indeed tend to move together, but only somewhat erratically. What matters more is a fact established by many past empirical investigations: that output is much less sensitive to changes in the amount of capital used than it is to the amount of labor used.** Furthermore, technological relations seem to be such that this relative insensitivity to capital increments or decrements is only enhanced when operations are forced away from the usual equilibrium in the direction induced by a comparative shortage of labor. As already pointed out, our calculations show that labor is the factor typically to be in short supply.

Beyond that, most of the sectors with which we deal are probably highly enough aggregated so that availability of raw-material flows and energy supplies would have no very important tendency to discriminate among sectors. A similar comment applies (with, if anything, greater force) to the influence of the social milieu. Therefore we

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*Cf. pp. 90, 91, and 105.

**Cf. Lomax, K. S., "Production Functions for Manufacturing Industry in the United Kingdom," _American Economic Review_, Vol. XL, pp. 397-399; Douglas, P. H., "Are There Laws of Production?" _American Economic Review_, Vol. XXXVIII, esp. pp. 10-22.

are confident that the values offered as indicative of sector survival rates are in general fairly reliable guides to the potential for inter-sector disparities. We ask no more of them.

If there is any connection in which there may be some question about this, it is in comparisons of postattack agricultural capacity with capacity in other sectors. Issues central to this Memorandum depend on those comparisons being valid, so we are obliged to reexamine them--bringing to bear, in the process, a good deal more information than we have heretofore found it convenient to muster.

In the first place, we shall account as realistically as we can for the contributions of both labor and capital to each sector's post-attack capacity. To this end, we shall be making separate evaluations of the vulnerabilities of the farm and nonfarm labor forces, and also of those of farm and nonfarm capital. We have already remarked that farm people do not currently have equal access to (ready-made) high-protection-factor shelter, and we have shown that reflecting this is a matter of some consequence for relative survival rates.* Similarly, there is a distinction to be made between the vulnerabilities of farm and nonfarm capital. The former (consisting, as it does, in substantial part of livestock and cropland or pastureland) is vulnerable to more weapon effects than is, for example, industrial capital. The survival rates that we shall report in this connection will reflect these differences.

<u>Assumptions Essential to Survival Estimates Required</u>

One prerequisite for the forthcoming calculations is knowledge of the detailed geographic distribution of capital in each sector to be dealt with: the incidence of hazards could not otherwise be quantified. Unfortunately, our source materials do not explicitly include data on either farm or nonfarm capital as such, and some improvisations are consequently necessary.

With respect to the farm sector, taken as a whole, we know that real capital consists predominantly of real estate, including land and buildings. Machinery, equipment, and household furnishings are

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*Cf. pp. 33-40.

collocated therewith. Apart from stored crops, which it is probably appropriate to neglect here, the balance of real farm capital is accounted for by livestock. We find that livestock accounted, nationally, for about 9 percent of the value of such farm assets in recent years (1962 and 1963), while the first-named items, excepting crops, accounted for 91 percent.* Since a very large part (close to 90 percent) of the value of all livestock is attributable to cattle and calves, our data on the geographic distribution of the "number of cattle and calves on hand" seems a suitable proxy for that part of farm capital. Our data on "farmland" can serve as a proxy for the rest.

Capital associated with that part of the nation's production which is nonagricultural is, with minor exceptions, situated in urban places. Since productive capital correlates loosely with contributions to gross national product, we should expect a substantial part of it to be associated with manufacturing. The majority of it, however, is employed in other activities--among them wholesale and retail trade, and transportation, communications, and other public utilities. While a data-collecting excursion might yield coefficients capable of relating invested capital, sector by sector, to our disaggregations of the labor force, a simpler approach seems more appropriate here.

We have elected to use a single proxy for nonagricultural capital. After rejecting MVA (on the ground that it reflects too little of the totality of economic activity), and "demand deposits" (partly on the ground that it reflects too much, but mainly because of its disproportionate concentration in New York City), we have settled upon very nearly the only possibility still open to us: "aggregate income."

There need be little question about the substance of this variable. What matters for our purposes is only its detailed geographic distribution--or, rather, what really matters is the similarity between its distribution and that of nonagricultural capital. Because aggregate income consists in part of returns on capital and in further part of payment for work done in conjunction with capital, there is a

*Cf. U.S. Department of Agriculture, Bulletin No. 281, The Balance Sheet of Agriculture, 1963, p. 2.

presumption that the geographic patterns of the two are similar and coincident--at least to an approximation good enough to satisfy our requirements. This entity falls recognizably short of being ideal because it includes farm as well as nonfarm income, but only a negligible distortion should result: farm income nowadays constitutes a very small part of the total.*

The vulnerabilities to weapon effects assumed in this part of our analysis are within the ranges of conventional values. Elements of the labor force are assumed to survive prompt effects to the extent that their residences are exposed to less than 6 psi peak overpressure. (This overpressure, nearer the low than the high end of the conventional range, was chosen in order to reflect not only the blast hazard--effective primarily through collapse of buildings in which the labor force is housed--but also, crudely, direct and indirect thermal effects.) Exposures to residual radiation were considered for workers who survived prompt effects. Ultimate survival was then dependent on the fallout shielding available to such people.

Urban workers, in common with other elements of the urban population, were credited with making use of shelter spaces identified by the National Fallout Shelter Survey (NFSS), to the extent that the number surviving blast effects could accommodate them,** and of dwelling basements beyond that. Some workers, of course, had neither type of

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*Anyway, maximizing the essential similarity between the variable of interest and its proxy becomes unrewarding beyond some point. The geographic patterns of demand deposits and aggregate income are somewhat dissimilar (remarkably so in New York); yet a side investigation shows that estimates of the nonfarm component of postattack Gross National Product would ordinarily be changed very little by shifting from one of these proxies to the other. Changes calculated are typically less than 1.5 percentage points, except in connection with attack 5-100.

**A detailed geographic distribution of NFSS spaces was not available; instead we once again resorted to a proxy, this time demand deposits, to approximate the true geographic distribution. (Like demand deposits, NFSS spaces are disproportionately concentrated in New York City and, to a lesser extent, in other metropolises.)

We assumed such shelters to survive if exposed to less than 6 psi, again in the expectation that fires would make many fairly blast-resistant structures unusable.

shelter immediately available to them and were assumed to rely on the slight shielding normal to their environment.*

Nonagricultural capital was assumed to be vulnerable only to prompt effects, in the expectation that decontamination would be resorted to locally wherever residual radiation would otherwise impede normal access to undamaged capital facilities. Once again, the index threshold for damage was taken to be a peak overpressure of 6 psi. (That we are willing to apply this threshold so universally follows from the nature of the damage mechanisms it is intended to reflect. People would not, for the most part, be killed directly by prompt weapon effects. Typically they would meet death as a result of being struck by parts of disintegrating structures or because of inability to escape from burning areas. Damage to industrial equipment is dependent on analogous considerations, and the combined blast and fire vulnerability of industrial structures is not in general of a different order from that for dwellings.)**

We are treating agricultural capital as a composite of two principal elements--one animate, the other inanimate--and, except in connection with prompt effects, we must consider their vulnerabilities separately. Because both elements are rather diffusely distributed, prompt-effect losses for them tend to be only a very small part of

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*Regional statistics on distribution of urban shelter by protection factor were derived, in the case of urban populations, largely from Selected Statistics on the Fallout Shelter Program, Department of Defense, Office of Civil Defense, Statistical Report 7720.20, June 1964; and Utilization of Existing Shelter in Metropolitan Areas, by David W. Goodrich, Stanford Research Institute, RM-OAP-12, February 1965.

Comparable rural shelter derivations were based on Fallout Facilities and Fuels on Farms in 24 Central and Southern States, U.S. Department of Agriculture, Statistical Reporting Service, SRS-3 (which relates to 1962).

Beyond that, availability of dwelling basements was determined from the 1960 Census of Housing, HC(1), States and Small Areas, U.S. Department of Commerce, Bureau of the Census.

Behavioral degradations were applied to high-protection-factor values. The LD_{50} was taken to be 450 roentgens, total dose.

**Cf. Tables 2 and 4 in White, Clayton S., I. Gerald Bowen, Donald R. Richmond, and Robert L. Corsbie, Comparative Nuclear Effects of Biomedical Interest, CEX-58.8, U.S. Atomic Energy Commission, January 1961; also, Chaps. V and VII in The Effects of Nuclear Weapons, U.S. Department of Defense and U.S. Atomic Energy Commission, 1962.

total losses. Therefore the particular damage threshold chosen should make little difference overall, and we have found it convenient to extend our use of 6 psi peak overpressure as a prompt-effect damage threshold to both categories.*

Unlike the sorts of capital employed in other industries, the value of farm capital may be affected drastically by fallout. Cattle and other livestock are killed by doses similar in magnitude to those which are fatal to man.** At the same time, livestock would typically not benefit much from structural shielding. Such animals would be exposed to nearly the full ambient hazard from the beginning, and there is no expectation that those fortunate enough to survive, say, the first fortnight's dose would then be moved to a fallout-free area. Rather, the doses already received would continue to be augmented.*** For such reasons it seems that a low radiation threshold may be appropriate, and we have assumed that exposed animals would retain their value as farm capital only if the ambient hazard integrated to a dose of less than 300 roentgens during the first two weeks following attack.

Land, the other element of farm capital being treated here, would neither be destroyed nor damaged--in the usual sense--by fallout. Its utility would, however, be impaired for substantial periods of time by the presence of radioactive contaminants. Residual gamma radiation might make use of farmland and pastureland impractical for a number of months following attack because of the threat it would constitute to the health of farm workers and of any surviving livestock. Certain

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*The land itself will, of course, not be damaged by exposure to effects accompanying 6 psi; but farm buildings, equipment, and livestock may well be.

**$LD_{50/30}$ values for brief exposures have been estimated at roughly 500 roentgens. Cf. Damage to Livestock from Radioactive Fallout in Event of Nuclear War, National Academy of Sciences, National Research Council Pub. No. 1078. The corresponding value for man is 450 roentgens.

***There is some evidence suggesting that the effective biological dose may at any moment be less than the simple integral, over time, of the dose rate, but contrary findings have also been reported. Cf. Leong, G. F., W. G. Wisecup, and J. W. Grisham, Effects of Divided Doses of X-ray on Mortality and Hematology of Domestic Animals, U.S. Naval Radiological Defense Laboratory, TR-606, January 1963.

explosion products, notably strontium-90, included in the fallout would present a different kind of problem: rendering food raised in such an environment dangerous to health. Because strontium-90 is a long-lived radionuclide, it would be a much more enduring hazard than external gamma radiation, and might require various accommodations for years.

That this major element of farm capital suffers impairment of utility but never any actual destruction poses some difficult analytical problems. Partial damage is not easy to evaluate in any connection. Heretofore we have felt justified in paying little attention to it because death and effectively complete destruction were dominant considerations. With respect to farmland, however, we must somehow take account of attack-produced impediments to normal use; to do otherwise would be tantamount to assuming that there was no damage whatsoever.

Still, we shall not be able to specify a thoroughly defensible relationship between the intensity of the calculated fallout hazards and the consequent diminution in capital value. Important pieces of information essential to the endeavor--including the appropriately discounted value (postattack) of the future costs of accommodating to the presence of contaminants--are simply not available.*

Therefore, for our analysis we shall assume that certain rates of radiation would constitute effective thresholds. Whenever and wherever the ambient rates were above the pertinent threshold, the farmland would of necessity be left unused (we treat it as valueless); conversely, where the rates were below the same threshold, farmland could be used freely (we ascribe undiminished value to it).

The radiation rates that we have chosen as thresholds are 800 milliroentgens per hour a fortnight after attack, and 3200 milliroentgens per hour. These are merely index rates, relating to an early time. We shall be looking at much later times, and determining the implications of the

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*Various sorts of accommodation are conceivable. One is to strip away the top few inches of soil on which food or feed are to be grown; deep plowing might be an adequate alternative where fallout is relatively light. Quite a different sort of accommodation involves shifting to nonfood crops, such as cotton, which would get around the ingestion hazard if nothing else. But costs are very uncertain until efficient mixes of the many conceivable accommodations have been identified for each circumstance.

index rates with respect to the times of interest. The bases for these choices are readily stated. The lower rate implies gamma radiation exposures of 1 roentgen per month for workers spending 40-hour weeks in the fields one year after the attack. This rate is approximately equal to the maximum occupational exposure permissible under current Radiation Protection Guide (RPG) standards (1 rem per month for no more than 3 consecutive months). Since the RPG standards are intended to include a safety factor appropriate to peacetime circumstances, much larger exposures might be risked if circumstances demanded it--as might well be the case in the aftermath of nuclear war.* It is partly to take some account of this possibility that the alternative threshold of 3200 mr/hr (implying, analogously, 4 roentgens per month) is also dealt with explicitly.

Each of the index rates is also interpretable with reference to the strontium-90 hazard. They define (subject to some large uncertainties) the extent of that hazard insofar as it results from local fallout.

As a consequence of this local fallout, substantial body burdens would be carried by any people who were wholly dependent on food produced in the affected area. The burden would be larger for the young than for the old. When an equilibrium condition was reached, that associated with the lower index would be about 500 Strontium Units (S.U.s) in young children (those born near the date of the attack) and about one-fourth as high in adults. The 3200 mr/hr index would imply levels four times higher--i.e., 2000 S.U.s in young children and about 500 in adults.**

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*Cf. The Effects of Nuclear Weapons, USGPO, 1962, pp. 586, 587.

**The strontium-90 burdens, as calculated for use here, reflect recent findings about fractionation and about uptake through the food chain.

We have assumed that one-fourth of all strontium-90 activity is associated with what the Quick Count fallout model treats as local fallout. (Cf. "Nuclear Debris Formation," by Edward C. Freiling, Glenn R. Crocker, and Charles E. Adams, in Radioactive Fallout From Nuclear Weapons Tests, U.S. Atomic Energy Commission, November 1965. Also, Wegner, L. H., Quick Count: A General War Casualty Estimation Model, The RAND Corporation, RM-3811-PR, September 1963 (Unclassified--For Official Use Only). If we assume, further, that fission fractions

Some appreciation for the significance of these hazard levels can be had by confronting them with current safety standards. The U.S. National Academy of Sciences has recommended that members of the general population should not be exposed to more than 200 Strontium Units (S.U.s). The Radioactivity Concentration Guide recommends that occupational exposures to individuals not be allowed to result in burdens higher than 2000 S.U.s. How much such standards might appropriately be relaxed under postattack stresses is not entirely clear. However, it has been estimated that a noticeable increase in bone cancer would occur if any large part of the population carried body burdens of 10,000 S.U.s.*

Actually, adjustments would have to be made in the body burdens just calculated in order to achieve a realistic appreciation of the complete strontium-90 hazard. For example, an upward adjustment would be needed to take account of the worldwide deposition that would eventually be superimposed on the areas at first receiving only local fallout. A downward adjustment would be needed because people are not solely dependent for foodstuffs on the worst-affected areas. The uptake would normally (even without deliberate selection of foods from relatively safe sources) prove smaller than calculated. However, it would not be useful to make adjustments of this nature without reflecting uncertainties involved, and that would require a more extended discussion than is appropriate here. We mention the strontium-90 hazard only to call attention to the multidimensional nature of the impediment to land use that nuclear fallout creates.

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average 0.5 and that about 100 curies of Sr-90 are generated per kiloton of fission, then close to 16 millicuries of Sr-90 are deposited per square mile for each milliroentgen of hourly gamma radiation measured two weeks after attack.

We further assumed that one curie of Sr-90 per square mile results in 40 S.U.s in the bones of young children and 10 S.U.s in adults. (Cf. Hardy, E. D., and J. Rivera, Fallout Program Quarterly Summary Report, Health and Safety Laboratory, U.S. Atomic Energy Commission, HASL-171, April 1, 1966, p. 35; also Rivera, J., Strontium-90 in Human Vertebrae, Fallout Summary Report, Health and Safety Laboratory, U.S. Atomic Energy Commission, HASL-146, July 1, 1964, p. 240.)

*Safety standards are given here as they appear in The Effects of Nuclear Weapons, USGPO, 1962, p. 615.

Dependence of Production on Survival of Labor and Capital

The various supplementary assumptions just introduced enable us to estimate, separately for the farm and nonfarm sectors of the economy, survival rates for the fundamental factors of production: Labor and Capital. Our next concern must be to set forth a relationship between such survival rates and the output levels that they make possible.

For the purpose, we turn to a well-tried production function. It was first introduced in 1928 and has found widespread application ever since. This is the Cobb-Douglas function.* It gives form to a familiar notion: that the factors of production are to a degree substitutable for one another (it being possible to produce a given level of output with alternative combinations of the input factors--e.g., with more units of capital and fewer of labor, or vice versa). We find the Cobb-Douglas function useful here because it provides us with a convenient way of preindicating, on the basis of benchmark observations of the U.S. economy, the various combinations of capital and labor that could (any degradations due to disruptions aside) be made to produce each conceivable level of output. The function is thus a means of bounding the outputs that could be produced if labor

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*Cobb, C. W., and Paul H. [now Senator] Douglas, "A Theory of Production," American Economic Review, Suppl., Vol. XVIII (March 1928), pp. 139-165.

Wassily Leontief, a proponent of quite another sort of model, has said: "For over 30 years--to be exact, since 1928--whenever a working economist was called on to describe in numbers or to interpret in analytical terms the relationship between the inputs of capital and labor and the final product of a plant, an industry, or a national economy as a whole, he was more likely than not to reach out for the Cobb-Douglas production function. Theorists questioned the arbitrariness of its form and statisticians the validity of procedures used in fitting it to given sets of data, but despite all criticism the familiar exponential equation was used over and over again, essentially, I think, because of its convenient simplicity." "An International Comparison of Factor Costs and Factor Use," American Economic Review, Vol. LIV, No. 4, Pt. I, June 1964, p. 335.

If the function is not all that has been claimed for it, it nevertheless retains its fundamental validity. As Gerhard Tintner remarked (in preparing to describe his own use of it): "We believe that Douglas and his associates have amply demonstrated the usefulness of his particular approach in spite of some criticism." "A Note on the Derivation of Production Functions from Farm Records," Econometrica, Vol. XII, 1944, p. 27.

and capital were no longer available in their usual amounts--absolutely, relative to one another, or both.

As we shall use it, the Cobb-Douglas function is

$$P = L^{K} C^{1-K},$$

where P, L, and C are indices of the amounts of net product, labor input, and capital input respectively. We take the preattack value of each to be unity, or 100 percent. Calculations of the postattack amount of product will, of course, be made by substituting surviving percentages for L and C into the equation and solving for P.

Values can be assigned to the exponents by reference to empirical data. When factors of production are rewarded in proportion to their products (which would be the case where perfect competition prevailed, a condition we assume to be approximated in the United States), the exponents are simply equal to those shares. That is, the value of K is the proportion of sector income earned by labor, while the value of 1-K is that earned by capital.*

In recent years, nonfarm labor has received 70 percent, or a trifle more, of the income it helped produce; the corresponding figure for farm labor has fluctuated in the vicinity of 60 percent.** With one exponent thus established in each equation, the other is determined automatically. Our production functions for nonfarm and farm output then become, respectively,

$$P_{\overline{F}} = L^{.7} C^{.3}, \text{ and}$$

$$P_{F} = L^{.6} C^{.4}$$

The values with which we have replaced K have additional significance. In our equations, they indicate how responsive output would be

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*Cf. Douglas, Paul H., "Are There Laws of Production?," American Economic Review, Vol. XXXVIII, No. 1, March 1948 (esp. p. 36).

**Derived from data in Tables 420, 428, and 432 of the Statistical Abstract of the United States 1962, and from data in Table 17 of Balance Sheet of Agriculture 1963, U.S. Department of Agriculture Information Bulletin No. 281.

to changes in availability of the individual factor inputs. For example, a 1 percent reduction in the amount of labor available to the nonfarm sector would, if the amount of capital remained the same, result in a 0.7 percent reduction in the amount of output that would be possible. Alternatively, a 1 percent reduction in the amount of capital available in this sector would, if the amount of labor remained the same, result in only a 0.3 percent reduction in the amount of output that could be achieved. The much greater sensitivity of output to labor than to capital is consistent with the findings of a great many empirical investigations.* Apparently it has long been a characteristic of twentieth-century capitalist economies.

Postattack Output Potentials

So far in this subsection we have (1) introduced a number of refinements into our damage assessment procedure in order to estimate, with as much accuracy as we can manage, survival rates for the fundamental factors of production, and (2) described an aggregative economic model for evaluating the output potential of those factors, however mismatched their survival rates may be.

Results for the nonfarm sector are plotted in Fig. 17. There, a family of curves, generated by solving the equation $P_{\overline{F}} = L^{.7} C^{.3}$, shows the various combinations of labor and capital that are capable of combining to produce selected percentages of preattack output. (Output levels are spaced 10 percentage points apart.) Superimposed are the results of our refined survival calculations for each of the 5 heaviest attacks.**

For example, points P_1 and P_2 relate to the consequences of attack 3-10 (involving the most heterogeneous target system). P_1 corresponds to survival of 43 percent of nonfarm labor and 72 percent of nonfarm capital. Falling on the 50 percent output curve, it indicates

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*Cf. Douglas, Paul H., "Are There Laws of Production?," loc. cit., and passim.

**We have several times noted that it is mainly in connection with the heavy attacks that significant disparities appear.

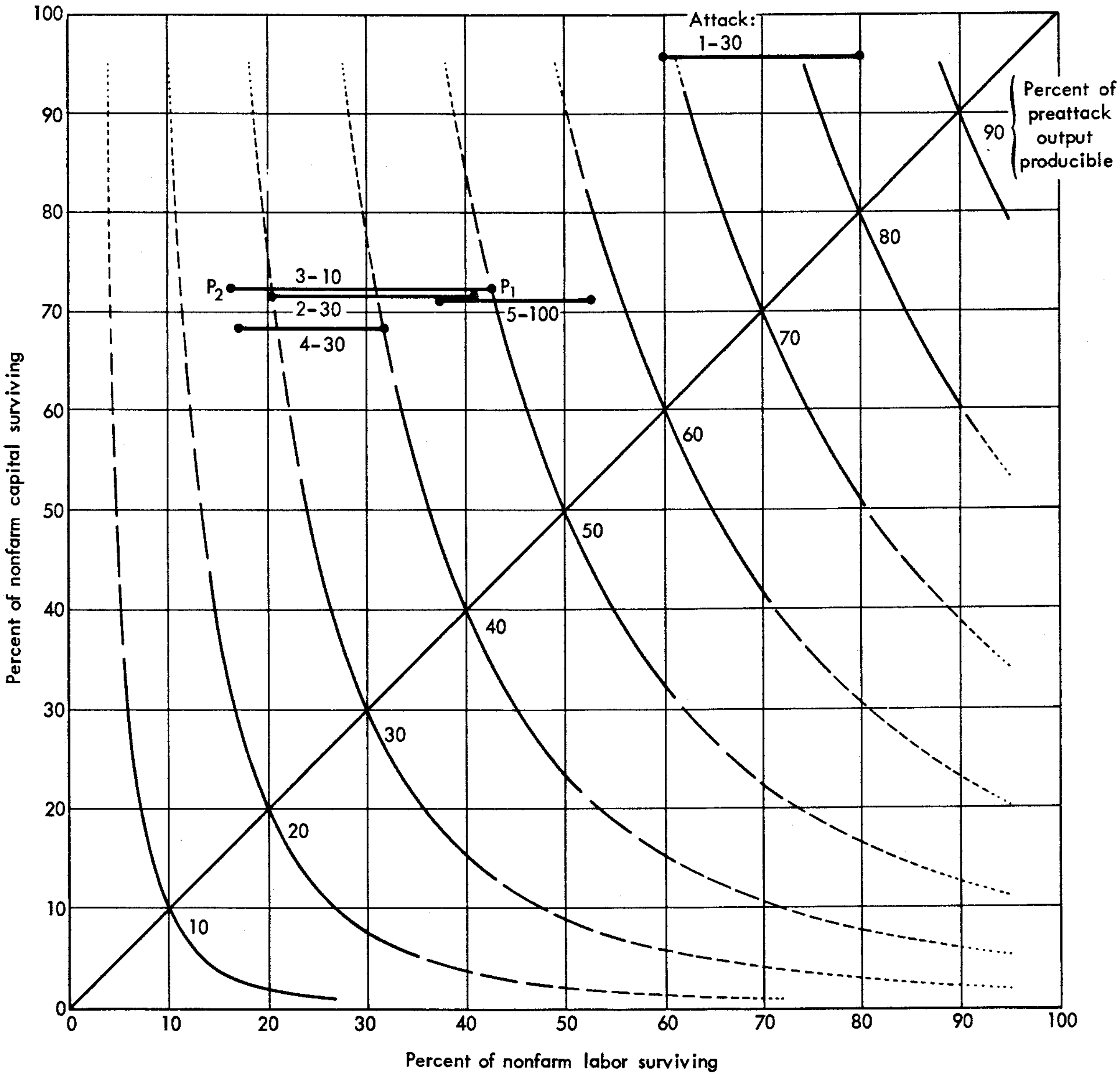

Fig. 17—Labor and capital available, and potential nonfarm output (after selected attacks)

that the factor survival rates stated imply the ability of nonfarm output to reach 50 percent of its preattack level. Similarly, point P_2 corresponds to survival of 16 percent of nonfarm labor, and, again, 72 percent of nonfarm capital. The sector's output could then reach but 26 percent of its preattack level. Points P_1 and P_2 differ only because the survival rates for labor are very different. The source of this difference is an assumption about civil defenses. P_1 corresponds to the fullest practical use of those fallout shelter spaces identified by the National Fallout Shelter Survey, and, beyond that, to informed use of basements. (Account has been taken, however, of such destruction of both shelter types as might result from blast and fire.) P_2, on the other hand, assumes that no use at all is made of NFSS spaces, surviving basements being the only source of shelter. Actual survival would presumably fall somewhere between the two--i.e., along the line P_1P_2, and, hopefully, near P_1.

Other aspects of the information displayed in Fig. 17 are interesting. The circumstance that all of our plotted points lie well off in a counterclockwise direction from the 45° line illustrates how much better capital would tend to fare than labor under any attack where fallout had to be contended with. Even the fullest utilization of NFSS spaces fails to reduce the fallout hazard to insignificance. (It would take general availability of shelter having better minimum quality to do that.)

There is a bright side even to this somber fact, however. Because capital tends to survive in larger proportion than labor, output per worker could be larger than in preattack circumstances. Such is the very nature of actual technological relations, and our Cobb-Douglas function mirrors reality in this respect. The result is that restorable output levels, as we compute them, are generally higher than one might suppose from inspection of survival rates for labor alone. They are, in fact, intermediate between the survival rates for labor and capital--and, because of the elasticities expressed in the exponents of our production function, nearer the former than the latter.

We may note, too, some differences among attacks. An attack that is in large part directed at installations remote from urban centers

(attack 1-30) has distinctly different consequences from other attacks. Attack 1-30 results in very significantly higher survival rates for both factors of production--and hence in much higher output potentials--than do attacks with other sorts of targeting. The contrast between the consequences of attacks 1-30 and 4-30 (these attacks differ only in that the 30 ranking urbanized areas are added targets in the latter one, each of the 30 receiving a 100-MT weapon) is particularly striking. Our calculations indicate that output could regain a level between 69 percent and 85 percent of the preattack value after attack 1-30, but would be far lower after attack 4-30; then the estimated potential is down in the 26 percent to 40 percent range.

A lesser point, but one meriting attention, is the variability of the range of labor survival among attacks. Note that for three of the attacks the use or nonuse of NFSS spaces makes upwards of 20 percentage points difference in the survival rate for labor, while for two (4-30 and 5-100) the same consideration has a distinctly smaller effect. The source of the explanation is by now fairly apparent. The two attacks where intentions about exploiting NFSS spaces make relatively little difference are those involving 100-MT weapons directed at the 30 most populous urbanized areas. NFSS spaces are for the most part above ground, and in substantial part in central portions of those 30 urbanized areas. Consequently, they are destroyed in disproportionate numbers under such targeting, and become unavailable as fallout protection.

Let us turn now to consideration of the <u>farm</u> sector. Results for it are plotted in Fig. 18, which is generally similar in its construction to Fig. 17. However, the family of equal-output curves shown here was generated by solving the equation $P_F = L^{.6} C^{.4}$; and the sensitivity explicitly depicted here is that of capital availability to the choice of a critical threshold, so that we now have ranges along the ordinate rather than the abscissa.

Point P_1 in Fig. 18 indicates that attack 2-30 would leave 47 percent of farm labor and 54 percent of farm capital "surviving," and that these resources would permit restoration of output to 50 percent of its preattack level. Implicit is the assumption that land on which the

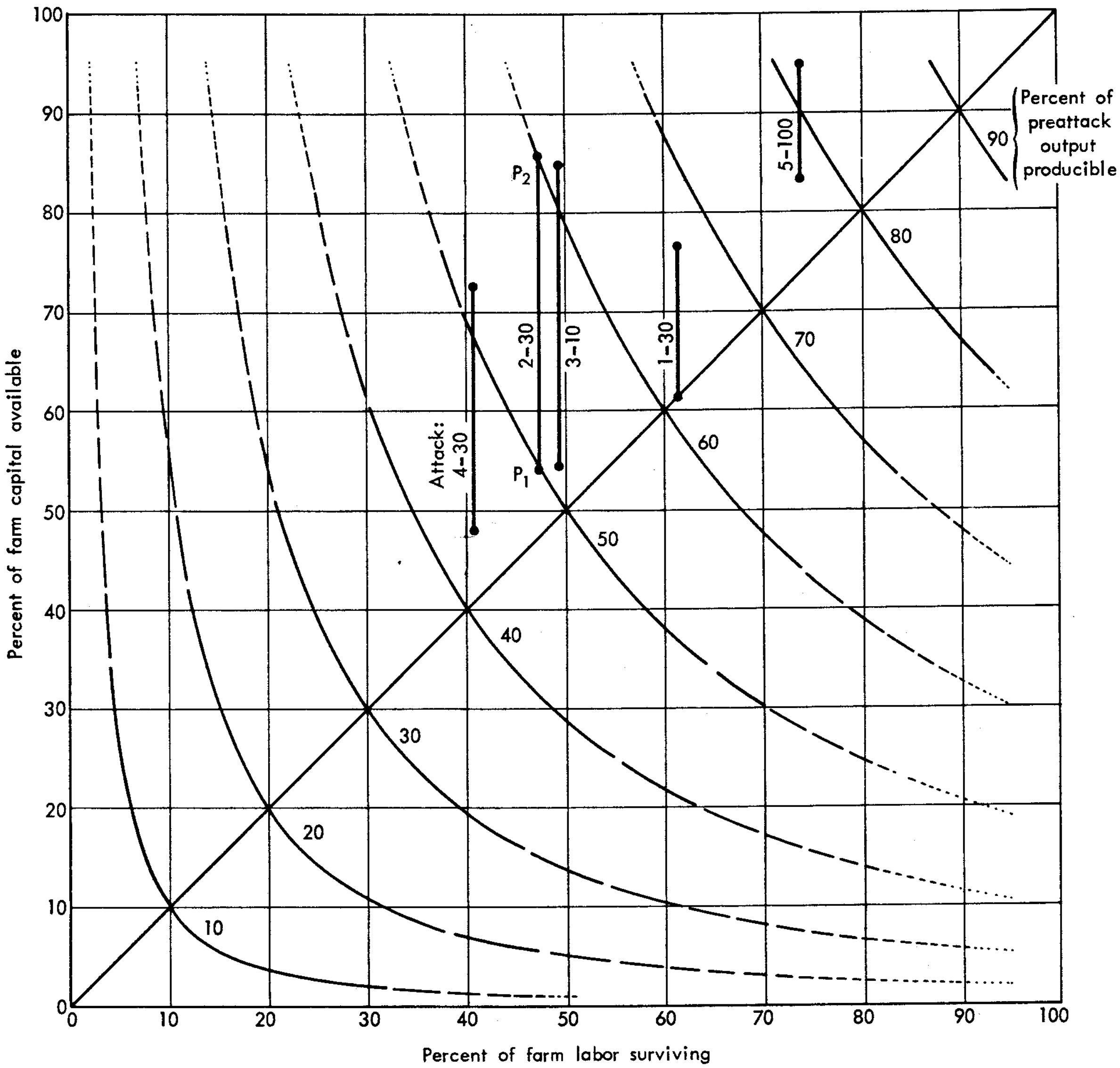

Fig.18—Labor and capital available, and potential farm output (after selected attacks)

radiation rate had exceeded 800 milliroentgens per hour a fortnight after attack would be left unfarmed during the time period of interest. Our alternative assumption--that land would be utilizable during the period of interest even though the rate had been four times as high (3200 mr/hr)--is reflected in point P_2. While the amount of surviving labor remains unchanged at 47 percent of its preattack quantity, this relaxation of our criterion increases available capital to 86 percent of normal, and enables farm output to come within 60 percent of its preattack value.

It will be recalled that the lower rate of radiation would cause any workers who attempted to farm the affected land a year after the attack had been concluded to be irradiated at a rate approximating the occupational maximum considered permissible for individuals (not for the general population) under present RPG standards.* The higher rate may be interpreted as reflecting a willingness, born of necessity, to shave the safety margin imbedded in RPG standards. We may note, however, that field workers would receive no larger doses on land originally subjected to the higher radiation rate if, instead of deferring operations for a year following attack, they deferred them for a year and a half. In other words, a factor-of-four difference in the hazard criterion for availability of land in this instance makes for a factor of about one and one-half difference in the time which would have to elapse before farm operations could be resumed in the affected areas. Depending on the season in which the attack had come, the extra six months involved might be an inconsequential delay, or it might mean the loss of a year's crops. We can draw some comfort from the fact that half or more of farm capital would generally be available even under the more restrictive criterion.

So far as differences among attacks are concerned, we observe that 2-30 and 3-10, both high-collocation attacks, produce results that are practically indistinguishable in their effects on the farm sector. (Much the same remark might be made about their impacts on the nonfarm sector--see Fig. 17.) Apart from that, however, the several attacks produce rather diverse impacts. Attack 5-100, the lightest of those

*Cf. p. 113.

represented in Fig. 18, and the one directed exclusively against major conurbations, unsurprisingly has the smallest effect on the farm sector. The second mildest impact results from attack 1-30, the brunt of which is directed at missile launch facilities. Interestingly, the effect of combining these two low-impact attacks is to produce not only the heaviest attack (4-30, delivering 13,200 megatons) and the largest impact of all, but an impact which, in terms of surviving output potential, is very nearly the sum of those produced by the two parts taken separately. That is, the two component parts of attack 4-30 complement each other rather well insofar as reducing the farm sector's potential is concerned. Of the reduction in output potential that our calculations attribute to attack 4-30, the amount resulting from overlap of its two component attacks (and hence from double killing) is less than 9 percent.*

These results and others we shall mention should all, of course, be understood in the light of the strengths and weaknesses of the computing model that we have used in generating them. We intend to offer some observations on that score, but will defer them long enough to present the principal findings of this section.

Farm and Nonfarm Sector Outputs Compared

We have now reached a point where we can make the kinds of comparisons that motivated the constructs just described. For this purpose it is convenient to pull data for the farm and nonfarm outputs together so that they can be viewed simultaneously. This has been accomplished in Fig. 19.

There, each pair of bars indicates the output potentials of factors surviving a given attack. The left-hand bar in each pair relates to the farm sector, the right-hand one to the nonfarm sector. Each bar has a double top in order to reflect alternative assumptions on which the underlying calculations were based. (The alternate assumptions are identical with those identified in connection with Figs. 17 and 18.)

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*A related discussion appears on pp. 25 to 27.

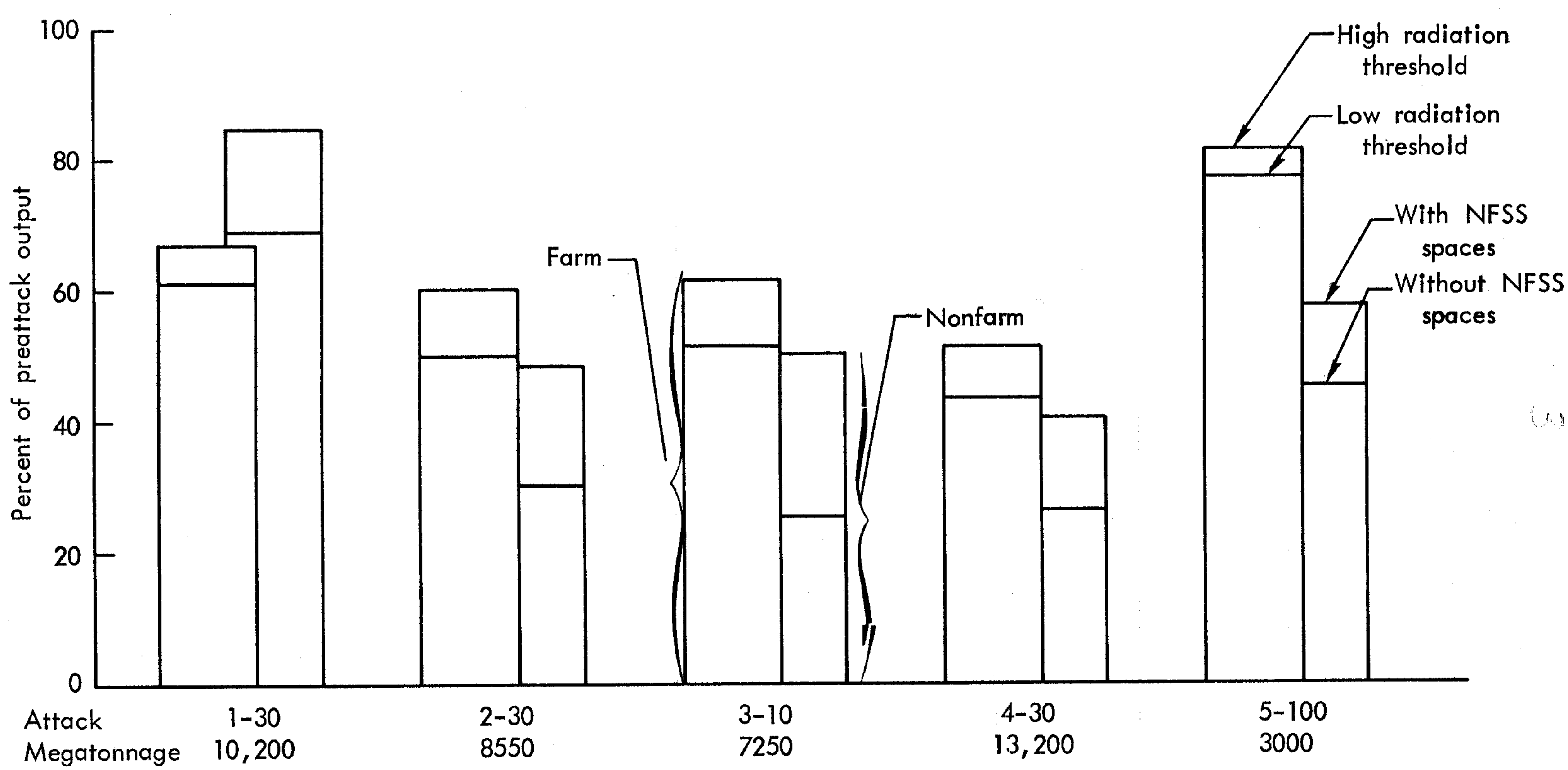

Fig. 19—Restorable farm and nonfarm outputs compared, for selected attacks

We see, for example, that farm resources surviving attack 1-30 would suffice to permit restoration of farm output to between 61 percent and 67 percent of its preattack level, depending on the rate of radiation at which field work might be inhibited. Similarly, factor (resource) survival in the nonfarm sector would permit restoration of output from that sector to between 69 percent and 85 percent of the preattack amount. The increment of output between 69 percent and 85 percent of the norm is attributable entirely to the availability to urban populations of NFSS spaces.

Note that this attack (1-30) provides an instance in which survival disparities would result in farm output being smaller than nonfarm output. Note, too, that it is the only such instance depicted.* The other attacks leave farm output relatively less affected. And this is so on the basis of <u>any</u> combination of farm and urban assumptions for which data have been charted. Were it not for the existence of fallout shelter identified during the National Fallout Shelter Survey, farm output potential in the aftermath of nuclear attack would prospectively exceed that for the nonfarm sector by a substantial margin, except in the case of an attack like 1-30 (when a small difference in the other direction might be expected). But the main point to be noted here is that, insofar as output on the farm is determined by the availability of farm labor and farm capital, it is only an exceptional attack that would discriminate against it.

At least that is the inescapable import of Fig. 19. However, the data presented there all derive from resource survivals that were averaged over the spectrum of winds treated. We have yet to rule out the possibility that our conclusion would need to be modified if we dealt with results for each wind condition individually. Fortunately, we can reassure ourselves about this on the basis of inferences drawn from data presented earlier--in Fig. 4, p. 35.

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*The three lightweight attacks (1-3, 2-3, and 4-3) tend to produce very high levels of surviving output, and hence relatively slight disparities. The present discussion would benefit little from enlargement to take explicit account of them.

Figure 4 illustrates the extent to which survival of two entities that happen to be highly correlated with those which concern us here is dependent on the vagaries of fallout winds. It takes no more than a glance to see that, except where target system 1 is concerned, there seems to be no possibility that individual winds would produce results inconsistent with our conclusion. The ranges of wind dependence for those two entities, farm people and urban people, do not come close to overlapping for any target system other than that at which attacks 1-3 and 1-30 are directed. Thus the conclusion stands.

However, the substantial overlap that Fig. 4 evidences in connection with attack 1-30 leaves us wondering whether the average (over winds) results that Fig. 19 displays for this attack are truly representative, or whether they may be concealing some atypical outcomes associated with particular meteorological conditions. The material on pp. 27 to 32 would encourage us to think that the latter might well be the case. The question, then, is whether even attack 1-30 would consistently leave farm capacity disadvantaged relative to nonfarm capacity. On the basis of those cases for which we have made calculations, the answer is yes--attack 1-30 would indeed discriminate against the farm sector consistently. Figure 20 displays the evidence that we have generated.* Only a minor qualification needs to be stated: if NFSS spaces were for some reason to go entirely unexploited, attack 1-30 could give a slight edge to restorable farm capacity under wind condition 1, and would do so under wind condition 2.

We reiterate: insofar as output on the farm is determined by the availability of farm labor and farm capital, it is only an exceptional attack that would discriminate against it. However, attack 1-30 is such an exception; and it discriminates rather consistently (although not always by a very impressive margin) against restorable farm output.

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*Reversal in the relative survival of farm and nonfarm entities between Figs. 12(b) and 20, where the outcome of attack 1-30 for wind condition 1 is concerned, results in substantial part from our refinement of vulnerability assumptions for the purposes of the latter figure. Nonfarm workers do have better access to high-quality fallout shelters, and nonfarm capital is less affected by fallout than their farm equivalents. Figure 12(b) reflects neither of these factors.

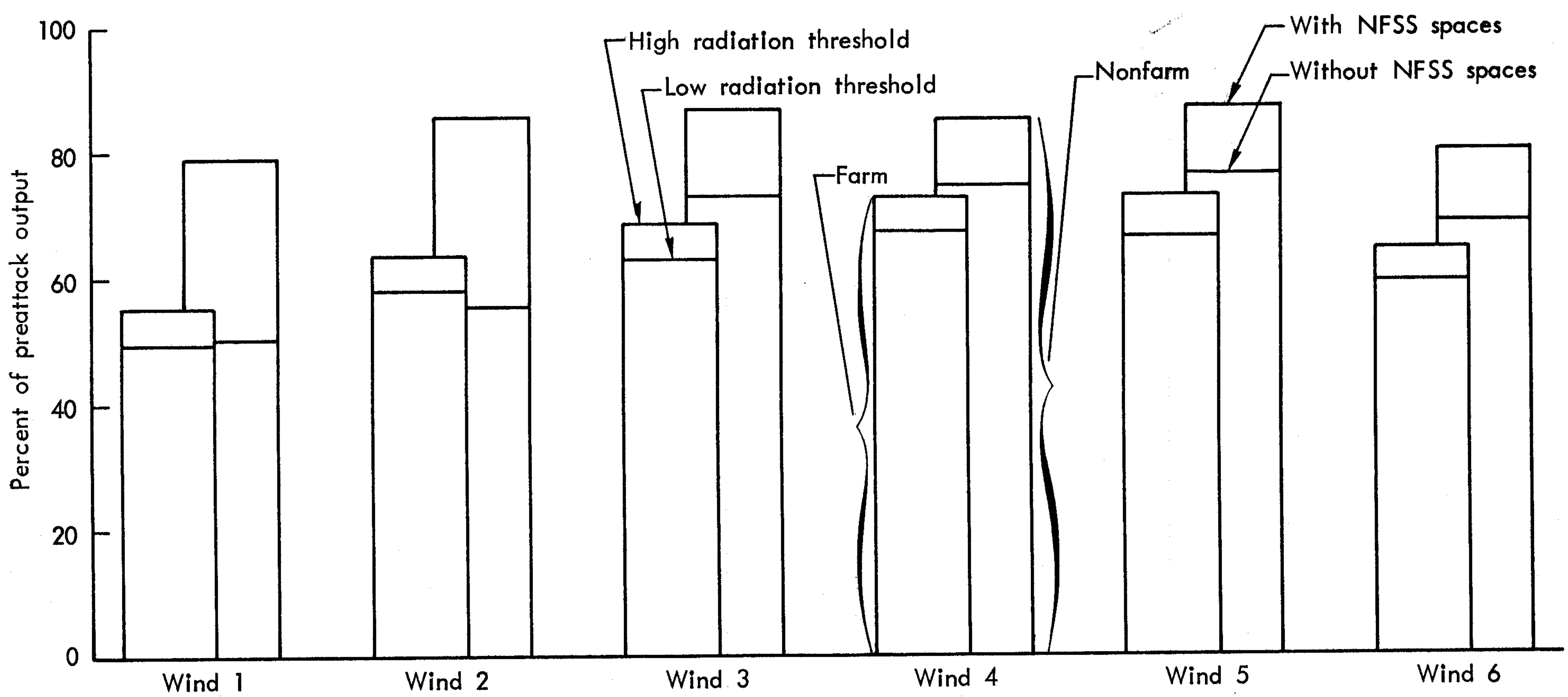

Fig. 20—Restorable farm and nonfarm outputs compared, attack I-30

Earlier, we called attention to the potential for attacks to create large interregional disparities. This we did with respect both to the general population* and to its farm and nonfarm components.** The refinements since introduced into our calculations of human survival, the extension of our interests to include capital survival, and the integrated treatment of surviving labor and capital via the Cobb-Douglas production function all combine to put a different face on the matter, but its essential character remains unchanged: interregional disparities are prospectively quite large--large enough so that contingency planners cannot in good conscience ignore them.

A sample of such disparities, here in terms of restorable outputs, is displayed in Fig. 21. We have chosen, arbitrarily, to illustrate with data generated in connection with attack 1-30, and Fig. 21 shows the consequences of that attack under the wind condition that maximized disparities. (There is reason to expect that comparable examples could be found among the consequences of the other attacks.)

Notice the sensitivity of the results depicted to the shelter available in NFSS spaces. Such shelter is an especially important determinant of these results in the Northeast (where NFSS spaces abound) and in California (where basements are few). So long as major conurbations are not attacked heavily, NFSS spaces would survive to serve as valuable fallout shelter. The attack whose consequences are portrayed in Fig. 21 is directed elsewhere; in the main, cities do not suffer from its prompt effects.

Dependability of Calculated Postattack Output Potentials

We have now seen that while imbalances in resource survival might prove substantial as between the farm and nonfarm sectors, they would only exceptionally be such as to cause agricultural output to be low relative to that for the rest of the economy. Thus any fears that agriculture's plight would be so peculiarly serious, postattack, as to be the one thing jeopardizing economic viability are to a considerable extent dissipated. But this is not the whole story; and, even if it were, we should want to know how much confidence our Cobb-Douglas model merits in this application.

In applying the Cobb-Douglas production function here, we have placed our faith in a relationship that is more than merely conceptually credible;

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*Cf. pp. 29 to 32.

**Cf. pp. 38 to 40.

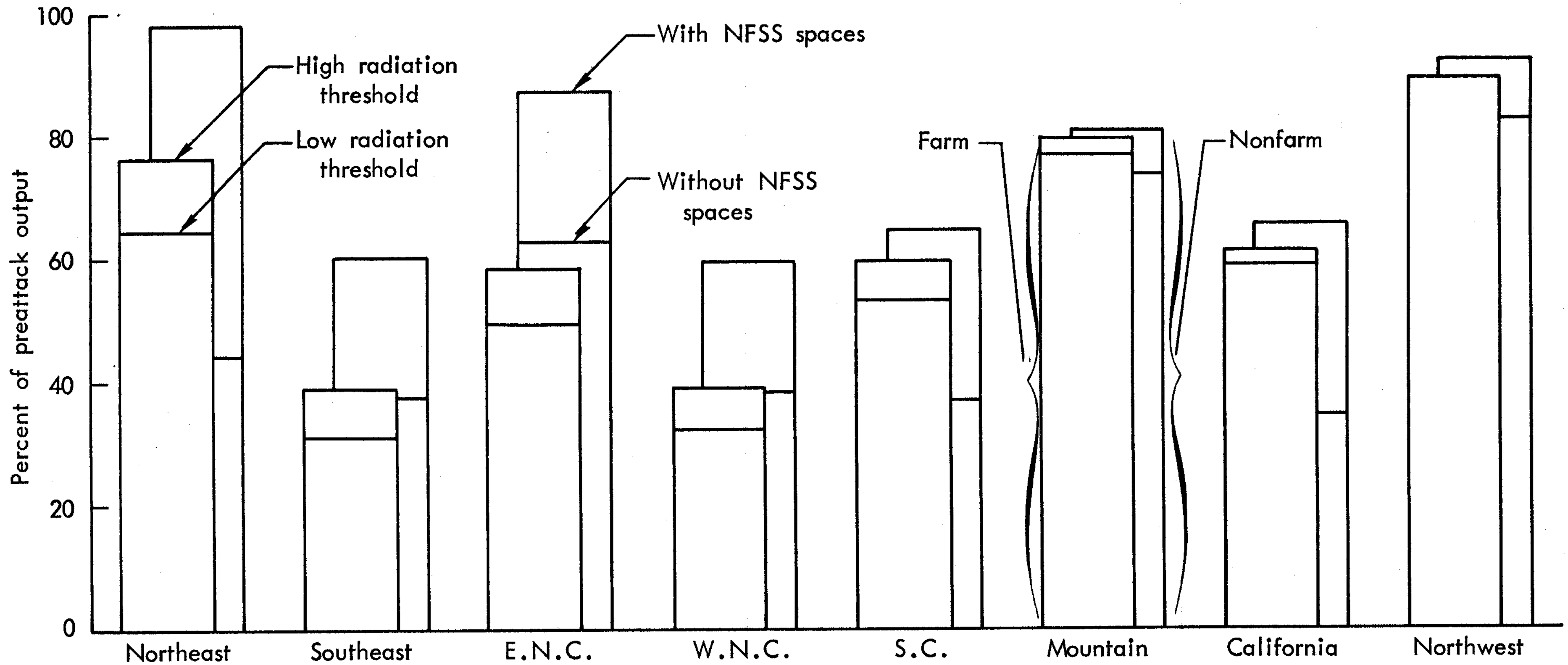

Fig.21—Restorable regional farm and nonfarm outputs compared, attack 1-30, wind condition 1

it is one that has for many years been used (internationally) in empirical work, and that has survived the critical appraisals inevitably associated with such use. It is, in other words, as well-established a relationship as could have been chosen. But the Cobb-Douglas function nevertheless has its shortcomings, and we feel them acutely in this application.

We gave the function substance--and relevance to the U.S. economy--by fitting its parameters to statistics implicitly descriptive of production relations as these have existed in the United States during recent years. And, with that, we were able to generate the curves displayed in Figs. 17 (p. 118) and 18 (p. 121), as well as any point between those curves. The modeling is credible enough. We could, for example, conceive of the historical growth of any sector of the American economy in terms of some such figure. If, in that sector, capital and labor had increased in a roughly constant ratio from the beginning, output growing apace, the growth path would approximate a 45-deg line when plotted in a figure comparable to 17 or 18. Each point on such a growth path would have a date associated with it; and we could trace back along the path, identify the date at which output had been some given proportion of the current one, and observe precisely what quantitative relation the inputs then used bore to today's inputs. We could, for example, choose a date such that output was 70 percent of today's value and discover whether the labor and capital on hand to produce it were, each of them, in the neighborhood of 70 percent of their present-day amounts.*

We have been viewing attack damage as, loosely, the equivalent of a setback in time. With parts of labor and capital effectively removed by an attack, the sectors into which we have divided the economy would each be capable of producing less--just how much less being determined via Fig. 17 or 18. It is apparent, though, that we have had to make use of regions of those two figures which are far removed from the point at which the economy is now operating. However well established the Cobb-Douglas function is in the vicinity of the <u>current</u> point of operations, and however many instances can be cited of essentially the same function satisfactorily fitting points

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*Our example is hypothetical. For a discussion of actual relationships among inputs and output in the United States, see, e.g., Nelson, R. R., "Aggregate Production Functions and Medium-range Growth Projections," <u>American Economic Review</u>, Vol. LIV, No. 5, September 1964.

at which the economy formerly operated (then on a much smaller scale), we cannot be certain that sudden retrogression forced by resource destruction would leave it still as applicable as before. For one thing, we cannot be sure that returns to scale would remain virtually constant in the face of a drastic reduction in scale. Then, too, working at such a high level of aggregation, the model provides us with no insight into the extent to which component activities might initially be bottlenecks, or how long they would remain so. Further, we are anything but reassured by the fact that labor and capital would generally survive in proportions substantially different from those which obtain today. These considerations, together with the possibility that changes in the product mix might well eventuate, limit the interpretations that can be placed on results generated by models such as ours, and dampen our confidence in some of the interpretations that we do feel justified in offering.

All things considered, however, we are satisfied that the disparities indicated by our model are trustworthy enough to be taken seriously. Returns to scale might not remain precisely constant, but there is no convincing evidence that any important shift would take place--certainly none to indicate that disparities would be affected appreciably thereby. And while our model may conceivably allow for somewhat more substitutability between factors than would turn out to be realistic, we believe that any distortion arising from this source could affect disparities only modestly--and in the direction of reinforcing the conclusion that farm capacity would fare better than nonfarm capacity.* Finally, while the nature of the

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*Calculations made with respect to the 76 results plotted in Figs. 19, 20, and 21 reveal that if we assumed no substitutability at all between factors of production, restorable output levels in the farm sector would average 9 percent lower than stated, while those in the nonfarm sector would average 19 percent lower.

Since factors are known to be substitutable in substantial degree, our plotted farm results are not too high by anything like 9 percent, nor are the nonfarm results too high by anything like 19 percent.

product mix would surely be altered somewhat in consequence of a nuclear attack (partly because not all industries would survive in exactly the same proportion, partly because survivors might in the aggregate want a different collection of end products), we see nothing to suggest how the parameters of the Cobb-Douglas model should be modified on this account.

So far as such considerations are concerned, then, we are content with our findings. Certain other aspects merit comment, however. One is our application of a Cobb-Douglas function to each sector independently of the other--as if the farm and nonfarm sectors were totally independent of one another, neither requiring inputs produced by the other. This was, of course, done in the interest of simplicity and is not wholly realistic. It is probably fitting enough to disregard the nonfarm sector's dependence on the farm sector. The latter generates no more than 5 percent or 10 percent of the total national product, and only a fraction of that small amount consists of raw material inputs to the nonfarm sector.

But the converse relationship is more significant. Agriculture undeniably depends for its efficiency on inputs from the nonfarm sector--most notably on fertilizers, insecticides, fungicides, and herbicides from the "chemicals and allied products" industry, and on fuels and lubricants from the "petroleum products" industry.* The question demanding an answer, then, is whether damage to the nonfarm sector would cut off supplies of these items. A definitive answer must await more detailed research than is appropriate to this study. (Such research would have to deal with industries at a four-digit, or finer, level of disaggregation, and be more meticulous about all aspects of damage modeling as well.) All we can say now is that critical shortages of these important inputs appear unlikely on the basis of such information as is available to us.

In the first place, less than 10 percent of the "chemicals and allied products" industry's corporate sales are to agriculture; and

*Cf. Moll, Kendall, Jack Cline, Paul Marr, and Oliver Williamson, Review of Post Attack Farm Problems, Stanford Research Institute, December 1961.

in the case of the "petroleum products" industry, the proportion is even smaller--5 percent.* While the outputs of these supplier industries are not internally homogeneous, so that the particular products needed might conceivably become unproducible well before either industry was wiped out completely, it is not at all obvious that this would happen--or that it is even likely.** Anyway, the inputs critical to modern agriculture's efficiency are also produced outside the United States, and it is to be expected that an economy that was otherwise viable could meet such specialized needs via international trade. U.S. farms normally require only about $2 billion worth of the named inputs for full-scale operation.***

In view of all this, we conclude that agriculture's fate would not be overly dependent on the level of survival elsewhere in the U.S. economy. It follows that neglecting such dependence entirely may not have prevented us from getting tolerably good estimates of the farm sector's postattack potential. Beyond that, it must now be apparent that analysts who continue to view agriculture as the critical sector--the sector more likely than any other to jeopardize the economy's postattack viability--must be content to support their belief mainly by allusion to imponderables (e.g., induced changes in climate, or in ecology).**** Otherwise, the burden is on them to generate the sort of meticulous analysis that is capable, if anything is, of convincingly contradicting the indications described above.

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*Cf. Survey of Current Business, Vol. 45, No. 9, September 1965, pp. 34, 35.

**Cf. A Survey of the Long-Term Postattack Recovery Capabilities of CONUS (U), Table 36, Stanford Research Institute, December 1963 (Secret).

***Dollar Volume of Agriculture's Transactions with Industry, Table I (U.S. Department of Agriculture, Marketing Research Report No. 375).

****This seems to be their wont anyhow. Certainly Winter emphasizes the imponderables. (Cf. Winter, RM-3436-PR, loc. cit.) Our point is that those analysts don't have a great deal else to lean on: if our somewhat tentative appraisal is correct, other considerations generally argue against them.

Technological Feasibility Versus Predicted Accomplishment

The significance of estimated postattack potentials merits comment from another point of view. To this date, all estimates (wherever made) of the levels to which output might, in the short run, be restored after an attack have taken account of little more than technological feasibility. In general, analysts have attempted only to make explicit the (maximum) levels of production that would be compatible with assessments of resource survival. This is true whether the models used have been simple (Cobb-Douglas) or highly complex (Leontief system derivatives, such as PARM).*

The question of whether attack-induced disruptions of the social organization would quickly be overcome and permit reorganization of the economy to a point where full resource employment (and hence achievement of something like the calculated potentials) could be managed is, regrettably, beyond the scope of all such models. How important a consideration this is is suggested by the diminution, between 1929 and 1933, of almost 30 percent in U.S. gross national product--without any important change in the quantities of real resources available. We may note also that even conventional wars have sometimes been followed by prolonged periods of unemployment and underemployment of resources.**

Until socioeconomic organization is better understood, there is little to be done about this. We mention it here as caveat and stimulus. Our estimates--or any such estimates--of what might be technologically feasible should not be construed as predictions of what would be accomplished. Yet the need to make the transition from the one sort of estimate to the other is sorely felt. This is a direction in which research progress will be unusually welcome.

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*The acronym PARM historically derives from the model's early orientation toward defense problems. Cf., e.g., Wood, Marshall K. and John D. Norton, Post Attack Resource Management, National Planning Association, August 1959.

**Cf. Hirshleifer, op. cit.

Economic Impact Restated

While estimates of conceivable postattack states of the economy are subject to many reservations, most of the reservations are of relatively little concern so long as our interest is in the unevenness of survival and not in its absolute level. Certain of our computed results seem to be persistent enough (they persist through changes in input variables and in parameter values, and even through substantial changes in model character) so that we can place some faith in them. We believe these results to be indicative of the awful potential of reality.

One of the more persistent results of our calculations is that agriculture generally promises to fare better, in the event of nuclear attack, than the rest of the economy. When it does fare better, the margin tends to be large. Survival rates calculated for farm workers, for example, are frequently in the vicinity of 50 percent higher than those for their urban fellows, even when differences in shelter are taken into account.*

Large disparities are not at all typical when survival rate comparisons are undertaken as between one farm population and another, or between one urban population and another. Then our nationwide results include no margins as large as 50 percent, and margins are typically <u>much</u> smaller than that.*

There remains a question about how consequential disparities of the sizes encountered in our calculated data may be. It is one thing to recognize that the Japanese, the Poles, and the Russians (among others) must have overcome some such disparities. (That they did is indicated by the somewhat fragmentary data cited in Sec. II.) But it is difficult to obtain data complete enough to quantify their accomplishments adequately for present purposes. Anyway, our familiarity is with the U.S. economy, and it is with the U.S. economy that we are presently concerned. The question therefore is: are there data descriptive of some U.S. experience that are at all enlightening in this connection?

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*Cf. the subsection beginning on p. 94, and also pp. 33 to 38.

If we choose to view evolutionary changes in the structure of the American economy as consequences of implicit stresses (which is unexceptionable enough), a number of examples become available. These are for the most part much less interesting than we should like them to be, because the stresses were not accompanied by initial disruptions of the sort that nuclear attacks would surely produce. But they do show the magnitudes of structural changes that an initially healthy U.S. economy has taken in stride.

We cite, as a familiar example, the accommodations of the U.S. economy to the stresses of World War II. Between 1941 and 1943, manufacturing grew 34 percent in importance (measured in terms of number of employees). Most of this growth was in the "durables" sector, which appears to have employed about 50 percent more workers in 1943 than it had in 1941. Since agricultural employment remained nearly constant during that interval, it follows that durables manufacturing increased 50 percent relative to agriculture. These data, along with data for other sectors, are plotted in Fig. 22 (where the ordinate is growth relative to agriculture). Figure 22 also shows how much each sector would have to grow, relative to agriculture, in order to compensate for damage done by our hypothetical attacks.* The attack results selected for inclusion here are examples of extreme (i.e., extremely large) disparities.**

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*We have once again resorted, for the sake of convenience, to reference levels of hazards. It will be recalled that doing so exaggerates survival among agricultural workers relative to workers in other sectors. Actual accommodations, postattack, would therefore not need to be as large as suggested by the illustrations.

The reference levels are not the same for all the curves. For the most part we have used our standard one, identified by the code number 3000 (meaning that we are counting as surviving population elements exposed to less than 6 psi and less than a 3000 roentgen ambient dose during the first fortnight). For certain of the curves a lower radiation threshold exaggerated disparities, so we chose it. Such instances are identified by the code number 1000 (with a meaning analogous to that for "3000" except that the threshold dose is one-third as high).

**Historical data from Historical Statistics of the U.S., Series D-48 to D-56, except that the "durables" versus "nondurables" breakdown was derived by interpolation with the help of 1950 and 1960 population census data.

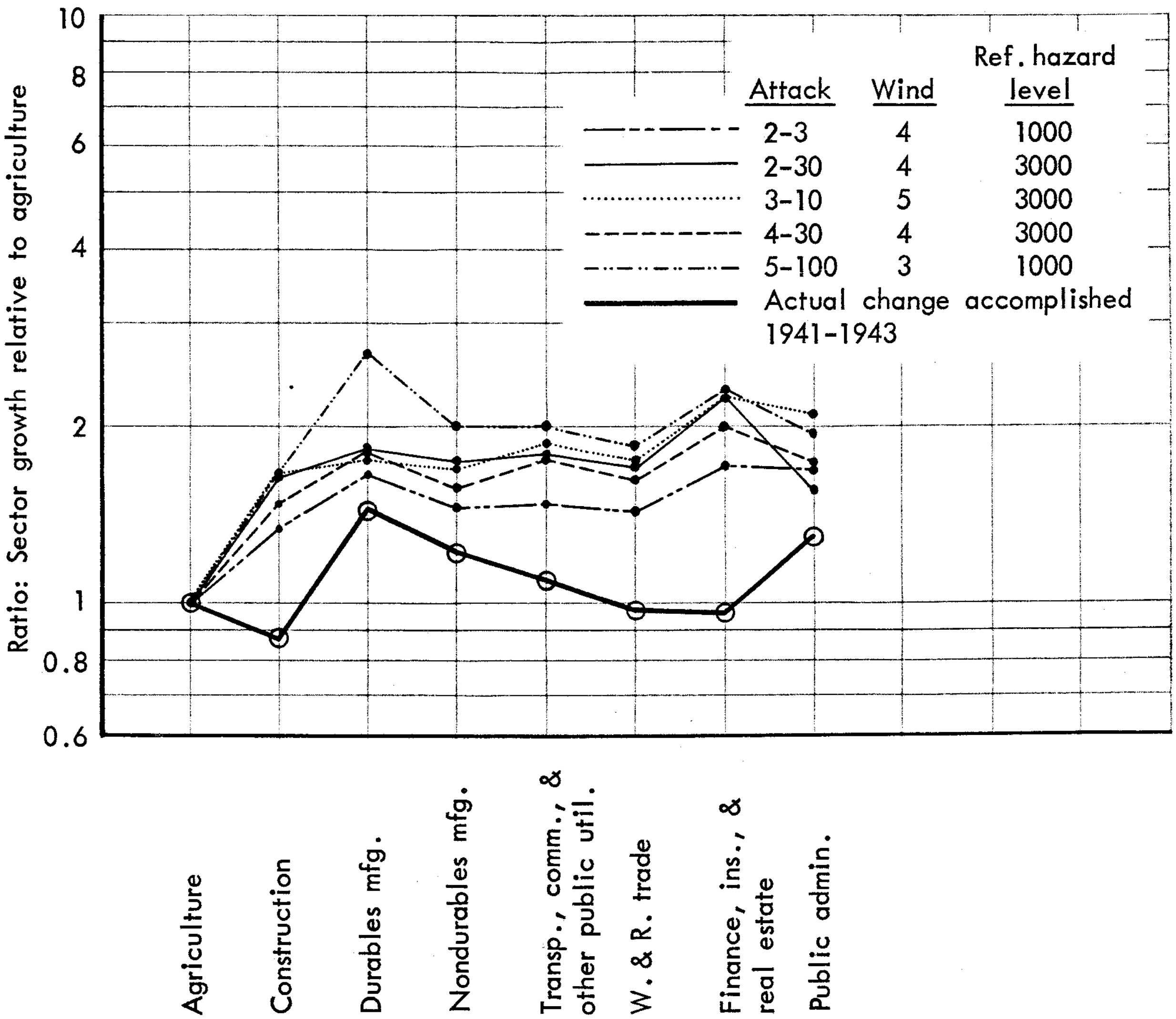

Fig. 22—Comparison of structural changes historically achieved with those necessary to overcome (extreme) imbalances which might result from nuclear attacks: nationwide data

Figure 23 is similar, but makes comparisons for a region (California).*

From these illustrations it is evident that, initially undisrupted and adequately motivated by an ongoing war, the U.S. economy has been able to accommodate fairly quickly--within the space of two years--to stresses calling for very substantial structural changes. While superficially comparable data would show that it has taken 10 years to achieve structural changes equal in magnitude to the most extreme ones consequent upon our attacks, such data would relate at least in part to peacetime, when vital interests were not as manifestly dependent on the accommodation being made successfully as they have been in wartime or would be if economic viability were at stake.

For indications that initial disruption does not prevent comparable achievements even though compounded with an unevenly damaged economy, see Sec. II.

A Note on Per Capita Resource Survival

Much of the discussion in this section has revolved about the fact that man's material resources tend to be less vulnerable to nuclear attacks than man himself. We have already noted (p. 119) one consequence of this: the resource basis would exist for making output per worker larger postattack than it had been preattack. Whether this possibility would actually materialize--and materialize soon enough to be of great import--depends on how successful society was in overcoming the disruptive effects of attack.

But the fact remains that, taken as a whole, resources would have been depleted in smaller proportion than the human population. In this sense, then, nuclear war could be expected to increase per capita wealth. And if circumstances were such that the increased stock of capital per worker could be utilized effectively, higher output per worker would mean that GNP for the nation as a whole would also be higher--on a per capita basis.

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*Cf. California Statistical Abstract, 1961; also, Census of Manufactures, 1947, Vol. 3, p. 92.

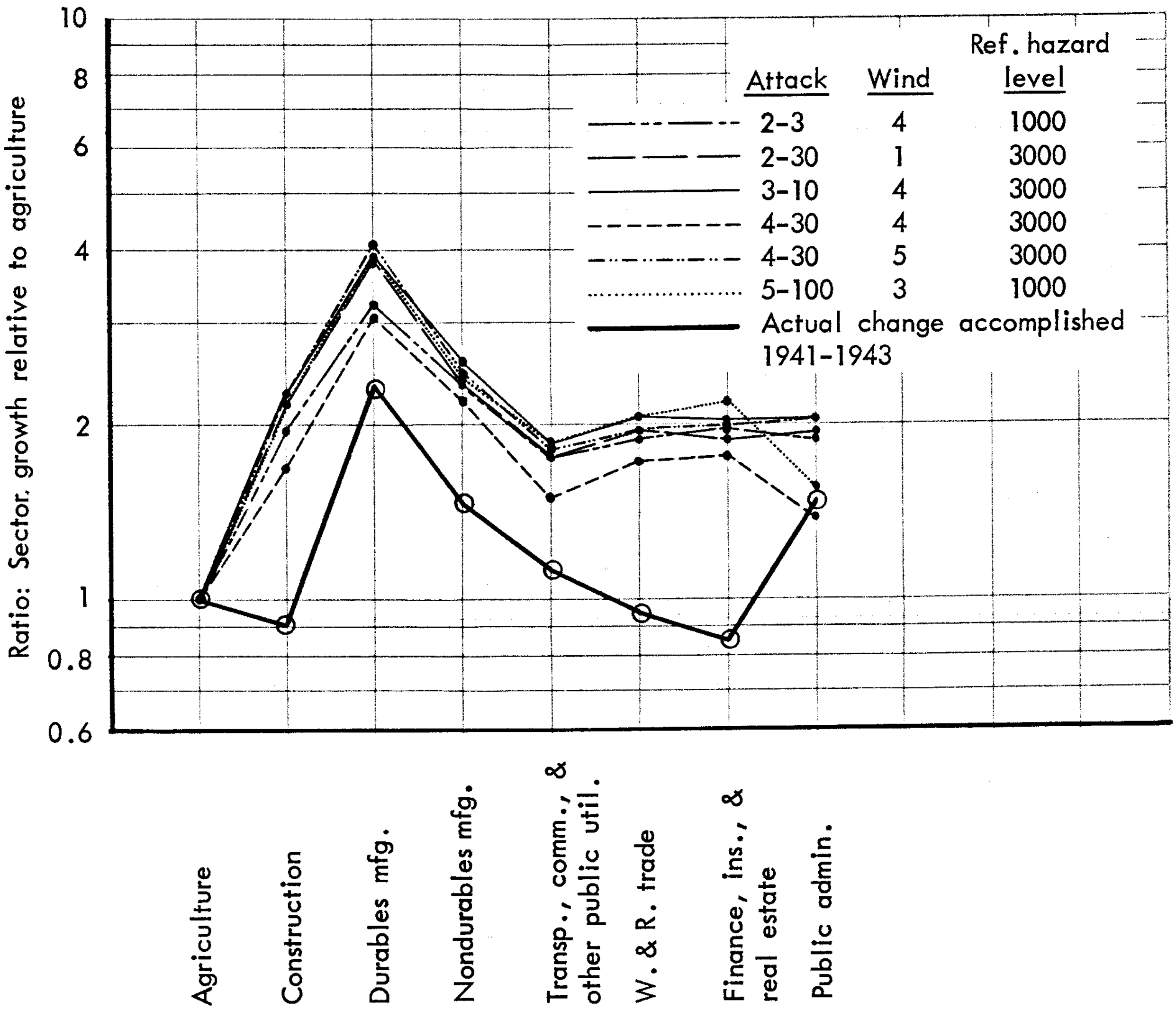

Fig. 23—Comparison of structural changes historically achieved with those necessary to overcome (extreme) imbalances which might result from nuclear attacks: regional data for: California

VI. CONCLUDING REFLECTIONS

The fundamental task to which this study has been addressed is that of improving the general appreciation of possible postattack states. We have done what we could to widen the scope of understanding while at the same time elaborating on particular points where new detail promised to be useful.

We have made substantial progress in improving inventories of what might survive attack. But, as was pointed out in Sec. II, these inventories are very uncertain--how uncertain we cannot usefully specify. This is a shortcoming we must live with: some things are simply not predictable in the senses we would wish them to be.

Anyway, our interest does not end with inventories. To tell us what we want most to know, our survival estimates, uncertain as they may be, must serve as inputs to further analyses. Our concern is with the organism itself, not just with its parts. We want to know whether the parts that might survive would constitute a viable organism, and whether regenerative processes could then be counted on eventually to restore the organism to something resembling its preattack state.

We have come some of the way along this further path. A good part of Sec. V has been devoted to exploring viability considerations, and by and large we have found nothing to persuade us that the prognosis is negative. But we have not come to grips at all with severe organizational problems that would inevitably be present after attacks as disruptive as those with which we have concerned ourselves. To do that is, regrettably, beyond the state of the art.

Yet we suppose few people will be entirely willing to accept the idea that going further *is* beyond current capabilities. People not well acquainted with the degree to which dynamic socioeconomic relations are understood will want to be furnished with some conclusive development of the implications of our data. Most especially, they will want to see some sort of prediction about the sorts of regenerative paths that might be feasible.

It is too early for that. To attempt that would require us to reduce complex and imperfectly understood reality to a simple model

that would at the same time be general enough to handle all the post-attack states to which our calculations have led us. But we cannot very well make a simple and reasonably dependable model of something that isn't understood. There is probably a better chance of making, one by one, a variety of loosely related partial models, each dealing successfully with some special aspects of the overall situation. Specialists steeped in subject areas which are only small parts of the whole may be able to model particular parts of the process very well, and they may be able to do much of this long before an all-encompassing model is practicable. We should take full advantage of such abilities so long as the effort involved is modest. There is a finite possibility that each partial solution to a problem will carry with it, as a side benefit, some suggestion about where the emphasis should fall in further research.

If we can acquaint enough such specialists with the nature of the context within which modeling work would be useful, and if we can supply these people with points of departure (both in terms of problem areas that are recognizably related to their specialties and in terms of data to support such investigations), we may succeed in stimulating fruitful bits of work suitable for eventual integration into a grand model that would genuinely be applicable in the large. Any model we could construct today would have only pretensions to such applicability.

Our main hope, then, is that we have highlighted enough separate facets of the general problem--the impact of nuclear war--so that specialists who have not previously become professionally involved will now see ways in which they can contribute something toward ultimate solutions. We hope, further, that the hazard tabulations appended will afford some of them access to necessary data that would otherwise be beyond their reach.

Appendix A

ADEQUACY OF THE POPULATION REPRESENTATION

It was not essential to the purposes of this study that survival estimates be correct in any absolute sense. It was important, however, that such estimates for the various populations be passably correct relative to one another. After all, the focus of the study was to be on the unevenness of attack damage--on survival disparities.

The comparisons that were to be made may be viewed as falling into three categories: urban versus urban, rural versus rural, and urban versus rural. Let us consider the extent to which population modeling has satisfied the requirements imposed upon it with respect to each category.

It is in attempting to calculate survival rates for the various urban populations that the greatest demands are generated on the quality of population representations. For the purposes of fallout calculations, it is ordinarily enough if inter-city and -county distributions are satisfactory. Fallout is a large-area effect, and consequently insensitive to very local imperfections in population modeling. But prompt effects are important only quite locally; and, with many weapons being, by assumption, detonated within cities (or very close to them), the intersection of the set of weapon effects with each urban population set can be expected both to be significant and to show some sensitivity to how intracity population distributions--if not intracounty ones as well--are modeled.

Our principal data source contained no information on the nature of either intracity or intracounty distributions for any of the populations. Nor were we, in general, able to obtain such data from other sources. We did manage to establish that, taken as a whole, the human inhabitants of cities are typically distributed in a circular-Gaussian manner, and to pin down the parameters of such a distribution for each city. We could not do as much with respect to rest-of-county populations. Fortunately, however, survival rates seem relatively insensitive to assumptions about intracounty distributions. (Cf. p. 49 fn.)

For urban populations other than the most inclusive set of people (for whom information was, as we have said, adequate), the only practical alternatives were (1) to assume them all to be located at the single population centroid already established within each elemental area, or (2) to assume those populations to be distributed (about the same points) according to the parameters of the Gaussians derived for urban people. The first alternative was patently unrealistic and also incompatible with using the best possible distribution for urban people. We chose the second alternative.

This is surely appropriate enough for those populations which are simply subsets of the most inclusive category of urban people in a given area. We would not expect large differences, on the average, in the way people arrange themselves about a population centroid, depending on such characteristics as age or industrial affiliation.

But standardizing on a single set of Gaussians is questionable with respect to certain items: demand deposits, and value added by manufacture. Both these entities relate to activities that have traditionally been concentrated in or near central business districts. While widespread use of the automobile has resulted in a tendency for diffusion even of these activities, that diffusion has probably not yet proceeded to the point where the variances we assumed are entirely realistic. It is to be expected, then, that prompt-effect survival rates computed for these two entities are not as comparable with those for other entities as they are with one another--or as those for the great majority of entities are among themselves.

Prompt effects are of almost vanishingly small consequence for the survival rates of rural populations. The comparability of results for one rural population versus another can therefore be discussed in terms of fallout alone. And, since fallout is a large-area effect, the distributions of populations about a monitoring point lose significance. We need only entertain questions of whether the points among which we distributed rural populations were individually well chosen, and whether there are enough such points so that the law of large numbers can be relied upon to swamp random distortions.

As mentioned in Sec. III, the eleven rural populations* were represented as being at 3105 monitoring points, one for each county (or county-equivalent). In 2535 of the counties, the monitoring point used had originally been selected as county centroid for the populace in general. We used it to locate urban and rural populations alike (except to the extent that the former were attributed to city monitoring points). We would have used members of that same set of centroids as monitoring points in all 3105 counties, but tests suggested that these were sometimes inadequate. Eventually we identified 570 critical counties for which more appropriate centroids appeared to be required. For the most part, these 570 were counties which contained installations to be targeted under one attack or another; many, however, were critical only in the sense of carrying heavy population weights.

Short of conducting our own field investigations, the most suitable county centroids that could be found for rural populations were cropland coordinates, a list of which had been prepared for the National Resource Evaluation Center. We were able to obtain a complete listing of them, and abstracted the 570 needed.**

Some feeling for the desirability of this improvement can be got by reference to test results. We elected to lay an attack of 10-MT weapons on target system 2 (Table 3, p. 62), and observe how radiation doses calculated for people centroids differed from those for cropland centroids over a nationwide random sample of 104 target counties, and over another sample, random except that it was correlated with the first, for 208 nontarget counties.

From the results, it was apparent that dose readings tended to be distinctly different at the alternative centroids. However, despite an average centroid separation distance of about 6 miles in target counties--and presumably a similar distance in nontarget counties--the differences were not overwhelming. The dose at one centroid

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*Items 1, 7, 38, 135, 148-153, and 159--as identified in Table 1, p. 52.

**Cropland centroids were supplied by the National Resource Evaluation Center. For a description see NREC, Resource Data Catalogue, Technical Manual No. 134, May 1963, with respect to Category B-2.

differed from that at the other by no more than 10 percent in 58 percent of the target counties, and in 69 percent of the nontarget counties. Similarly, the difference was no more than 20 percent in 72 percent of the target counties, and in 83 percent of the nontarget counties.

While such differences are certainly not trivial, the relevant question for our purposes was one of whether they would be noticeable in our final results, which were ordinarily to be aggregated into class intervals (on dose) whose limits were a factor of three apart--e.g., 100-299 roentgens, 300-999 roentgens, and so forth. Examined in this light, we found that in 81 percent of the target counties the class interval into which the calculated dose fell was the same whichever centroid was used. The corresponding figure for nontarget counties was 86 percent. Of course, even when using one set of centroids instead of the other caused shifts of class interval, the shifts sometimes offset one another. Making allowance for this effect, 90 percent of target counties either stayed in the same class interval regardless of which centroid served as basis for the dose calculation, or were replaced as the result of a compensating discrepancy in another county. The corresponding figure for nontarget counties was 97 percent.

In other words, the (ultimate) visible effect of rather sizeable shifts in county centroids was quite small so far as nationwide results were concerned. While we are satisfied that the effort invested in utilizing the best available centroids in the 570 most critical counties was justified, it is not obvious that much would have been gained by extending such centroid improvement to less critical counties.

It is apparent ex post that early indications about urban-farm disparities were correct; such disparities are persistent and large. Consequently, there need be little concern that whatever imperfections remain in our population representations are in general capable of distorting the comparisons being made. Certainly modeling adequate to permit valid comparisons among survival rates for urban populations is, on the urban side, more than adequate to allow valid urban-farm comparisons. And we have found survival rates among farm populations

to be relatively insensitive to modeling detail. Even regional results give indications of being generally of good accuracy. Only with respect to the Far West--particularly California--do we have any reservations. We suggest that urban-farm comparisons for California be regarded as tentative.

In general, it appears that no very substantial improvement in the quality of our results would have been achievable without undertaking extremely burdensome elaborations of the population representation. Where urban populations are concerned, our 315 monitoring points already locate fairly precisely about 50 percent of all urban people. Adding a further urban monitoring point for each of the next 400 ranking cities would improve the accuracy with which we located only another 11 percent or 12 percent of the urban population.

Perhaps the most valuable direction in which improvement might have been sought is that of subdividing political units, and adding monitoring points accordingly. To do that, however, would have meant departing from our original choice of source materials, and instead assembling data for all 28 populations from unpublished census materials.

All in all, we are satisfied that our population representation was appropriate to the nature of our objectives, and that the results achieved are fairly indicative of those that could be obtained on the basis of much more elaborate modeling.*

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*For a general discussion of the influence of population representations on casualty or damage predictions, and an explicit full-scale test of our modeling with respect to prompt effects, see Goeller, B. F., The Sensitivity of Mortality Estimates to Variations in Aggregate Population Representations, The RAND Corporation, RM-5141-TAB, December 1966.

RM-5148-SRI

Appendix B

DETAILED SURVIVAL TABULATIONS

The following pages contain detailed tabulations of the percentages of populations exposed to prompt effects and to two alternative levels of ambient radiation dose (i.e., smooth-plane dose, sans shielding). Most of the calculated results reported in the text were based on these tables.

Results are tabulated for the 48 conterminous states as a whole and, separately, for seven of the eight subregions identified in Table 6. (Tabulations for California, the eighth subregion, are omitted, partly as an economy and partly because California results are of somewhat lower quality than the rest. Results for California can, of course, be inferred from those which are presented.)

A set of results which is in that sense complete is tabulated for each of the eight attacks described in Table 3 (p. 62), beginning with attack 1-3. It will be noted that attack designations, as they appear in the following pages, omit the hyphen between the number identifying a target system and the remaining digits, which specify a modal yield.

Column 1 identifies population items. The identifying numbers are those used in the County and City Data Book, 1962* and in Table 1 (p. 52).

Column 2 gives a recent total population value for each item. (Alaskan and Hawaiian contributions have been omitted from national totals.) Units are ordinarily those used in the County and City Data Book, 1962, but have sometimes been truncated.** Where the source data were in percentage terms, computed values in absolute terms have been substituted.

Column 3 gives the expected percentage of each population exposed to prompt effects (within the 6 psi peak overpressure circle from ground bursts).

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*U.S. Department of Commerce, Bureau of the Census.

**Land in farms (item 135), originally in acres, appears here in terms of square miles.

In general, the totals shown are machine summations of values truncated at the county level of detail and will consequently not agree precisely with County and City Data Book, 1962 values.

Table 6

COMPOSITION OF REGIONS

Region	States Included
Northeast	Maine, Vermont, New Hampshire, Massachusetts, Connecticut, Rhode Island, New York, New Jersey, Pennsylvania
Southeast	Delaware, Maryland, Virginia, District of Columbia, West Virginia, North Carolina, South Carolina, Georgia, Florida, Kentucky, Tennessee, Mississippi, Alabama
East North Central	Illinois, Indiana, Ohio, Michigan, Wisconsin
West North Central	North Dakota, South Dakota, Minnesota, Nebraska, Iowa, Kansas, Missouri
South Central	Oklahoma, Arkansas, Texas, Louisiana
Mountain	Montana, Idaho, Wyoming, Nevada, Utah, Colorado, Arizona, New Mexico
California	California
Northwest	Washington, Oregon

Columns 4-9 give, for each of six selected winds, the calculated percentage of each population located where ambient radiation hazards* fall within the interval specified at the head of the table.

Column 10 is an arithmetic average of columns 4-9.

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*Smooth-plane integrated dose calculated in accordance with assumptions as stated on p. 63. Intervals of "integrated doses" represent accumulation from time of attack until 14 days (336 hours) later, and are expressed in roentgens.

U. S. TOTALS — ATTACK 13 — INTEGRATED DOSE INTERVAL=0-999

POPULATION ITEM	TOTALS	PROMPT	15 DEC 51	25 DEC 51	15 MAY 51	15 JUN 51	5 JUL 52	25 NOV 50	SIX WIND AVERAGE
1	2971499	0.4	91.3	92.1	90.5	90.6	90.2	88.7	90.6
3	1784656	1.2	92.9	94.7	91.3	86.9	88.2	87.9	90.3
6	1246526	1.5	93.2	95.3	91.2	84.9	86.9	87.3	89.8
7	1343059	0.3	90.2	91.2	90.1	91.3	92.9	88.8	90.8
10	2019872	1.3	92.7	94.6	90.9	86.8	87.8	87.7	90.1
12	1653024	1.0	93.1	94.6	92.1	87.4	88.9	88.5	90.8
24	675084	1.6	93.6	95.4	90.9	85.1	88.0	86.8	90.0
25	329959	1.4	93.3	95.0	91.1	85.9	88.0	87.5	90.1
74	1103668	1.2	94.4	95.7	93.0	87.4	90.0	89.5	91.7
94	1387922	0.7	95.3	96.9	94.7	89.2	91.3	90.2	92.9
135	1750307	0.4	89.6	90.0	87.9	89.1	89.8	87.7	89.0
148	3039695	0.4	89.8	89.3	88.4	89.8	90.0	87.0	89.1
149	1331375	0.4	89.4	87.5	88.2	88.1	89.9	85.3	
150	401179	0.3	91.9	95.1	92.2	92.7	90.8	88.4	
151	225141	0.4	88.7	94.0	91.0	91.4	87.1	84.4	
152	1076563	0.3	89.8	88.3	86.7	90.5	90.4	88.9	[illegible]
159	1961169	0.3	92.5	89.8	90.5	92.1	92.5	88.7	91.0
37	642352	1.2	93.2	94.9	91.6	86.9	88.5	88.0	90.5
38	424202	0.4	90.1	90.8	89.3	90.1	91.2	87.4	89.8
39	379219	1.3	92.4	94.4	90.0	86.4	87.1	87.2	89.6
40	982094	0.8	94.7	96.4	94.2	88.8	90.4	89.1	92.3
41	765932	0.7	94.4	96.7	93.7	88.9	90.3	89.5	92.3
42	443688	1.1	93.5	95.4	91.7	87.4	88.6	88.2	90.8
43	1174589	1.2	93.0	94.9	91.4	86.7	88.2	88.1	90.4
44	268623	1.3	93.5	95.4	91.1	85.6	87.7	88.4	90.3
45	337926	1.3	92.7	94.0	90.5	86.0	88.0	87.8	89.8
46	317218	3.9	90.8	92.0	85.3	79.5	80.8	81.2	85.0
153	92303	0.3	89.7	90.4	88.6	90.1	90.0	88.1	89.5

REGION -N.EAST — ATTACK 13 — INTEGRATED DOSE INTERVAL=0-999

POPULATION ITEM	TOTALS	PROMPT	15 DEC 51	25 DEC 51	15 MAY 51	15 JUN 51	5 JUL 52	25 NOV 50	SIX WIND AVERAGE
1	163593	0.3	98.0	99.2	97.6	97.0	95.9	87.9	95.9
3	446779	0.4	99.1	99.1	96.4	88.9	89.0	91.7	94.1
6	357939	0.4	99.3	99.1	96.9	88.3	88.6	93.4	94.3
7	91118	0.4	98.0	99.2	97.4	95.9	95.1	82.9	94.8
10	465707	0.5	99.0	99.1	96.2	88.7	88.8	91.4	93.9
12	449968	0.4	99.0	98.9	96.2	88.1	88.1	91.5	93.6
24	204904	0.4	99.3	99.3	96.3	90.3	89.7	93.6	94.8
25	93456	0.4	99.2	99.2	96.3	89.4	89.2	92.7	94.3
74	384765	0.2	99.5	99.4	98.6	91.5	91.6	95.5	96.0
94	452781	0.4	99.3	99.3	97.9	89.2	89.9	92.4	94.7
135	56329	0.3	98.5	99.3	98.0	96.6	95.5	84.9	95.5
148	229209	0.5	95.9	98.2	96.2	95.0	94.0	83.9	93.9
149	66431	0.8	93.4	97.0	96.3	93.5	94.4	81.7	92.7
150	96556	0.3	98.7	99.5	97.6	96.3	93.9	86.0	95.3
151	40137	0.7	92.4	96.4	92.0	94.8	93.5	84.4	92.2
152	26105	0.3	97.3	99.4	97.6	94.4	94.0	80.7	93.9
159	164942	0.6	94.5	97.3	97.4	95.6	95.8	80.8	93.6
37	170972	0.4	99.1	99.1	96.6	88.8	88.9	91.9	94.1
38	34351	0.5	96.7	98.5	96.6	94.9	93.9	84.5	94.2
39	87191	0.4	98.6	99.0	95.6	89.1	88.9	91.6	93.8
40	305811	0.4	99.2	99.2	97.4	88.9	89.4	91.7	94.3
41	265616	0.4	99.1	99.1	96.8	87.4	88.1	90.4	93.5
42	118945	0.3	99.3	99.2	97.3	90.7	90.6	92.9	95.0
43	297900	0.4	99.1	99.1	96.4	88.9	89.0	92.4	94.2
44	86053	0.4	99.3	99.3	96.7	89.7	89.4	94.4	94.8
45	62973	0.5	99.1	99.2	95.9	86.6	86.8	91.0	93.1
46	77800	0.5	98.9	99.1	95.5	87.5	87.4	90.8	93.2
153	5010	0.2	99.1	99.6	97.9	96.2	95.0	85.1	95.5

REGION -S.EAST ATTACK 13 INTEGRATED DOSE INTERVAL=0-999

POPULATION ITEM	TOTALS	PROMPT	15 DEC 51	25 DEC 51	15 MAY 51	15 JUN 51	5 JUL 52	25 NOV 50	SIX WIND AVERAGE
1	447603	0.2	94.2	95.0	92.7	94.4	94.9	92.4	93.9
3	360213	2.7	90.8	93.1	86.9	86.9	81.0	83.6	87.0
6	206811	4.6	89.1	92.3	84.1	81.9	72.1	77.4	82.8
7	440215	0.2	92.6	93.1	90.9	92.6	94.9	89.4	92.3
10	439169	2.7	90.8	93.1	86.2	86.3	80.4	83.1	86.7
12	315169	2.2	91.5	93.1	89.0	88.7	82.8	84.9	88.3
24	93769	6.1	88.4	90.4	80.2	78.7	70.1	72.1	80.0
25	55169	4.2	89.7	91.9	84.2	83.4	75.8	79.1	84.0
74	152237	5.2	88.6	91.0	85.4	82.8	75.4	77.5	83.4
94	195435	1.3	89.2	95.6	93.4	89.8	80.9	81.6	88.4
135	236925	0.1	93.9	93.0	92.5	93.5	94.8	91.2	93.2
148	528412	0.2	94.4	90.2	91.2	90.7	91.8	88.1	91.1
149	293619	0.2	94.4	88.5	90.1	89.6	93.8	86.2	90.4
150	53851	0.3	92.8	90.6	88.4	90.5	86.4	91.8	90.1
151	71310	0.1	96.5	96.5	96.6	91.3	84.6	86.1	91.9
152	103448	0.2	93.5	89.9	91.5	93.0	93.5	92.1	92.3
159	778310	0.2	94.9	91.5	89.5	93.1	93.2	89.7	92.0
37	128971	3.1	90.3	92.9	86.7	86.4	80.2	82.3	86.5
38	120665	0.3	93.7	92.2	90.4	91.6	93.6	88.7	91.7
39	87450	2.8	91.0	92.8	86.4	87.2	80.2	84.2	87.0
40	122760	1.6	89.4	95.4	90.4	87.9	80.2	81.7	87.5
41	163746	1.2	90.9	95.8	92.7	92.5	87.7	87.4	91.2
42	81201	3.2	90.3	93.3	86.2	85.2	76.4	81.2	85.4
43	227604	2.8	90.7	93.1	87.0	86.8	79.1	82.9	86.6
44	45079	4.1	90.0	92.6	84.9	84.2	74.1	79.5	84.2
45	66285	3.3	90.8	92.2	85.3	86.5	81.3	83.0	86.5
46	77608	12.4	83.6	84.3	66.3	64.9	58.8	63.9	70.3
153	13755	0.1	93.5	91.8	93.1	93.4	93.6	92.0	92.9

REGION -E.N.C. ATTACK 13 INTEGRATED DOSE INTERVAL=0-999

POPULATION ITEM	TOTALS	PROMPT	15 DEC 51	25 DEC 51	15 MAY 51	15 JUN 51	5 JUL 52	25 NOV 50	SIX WIND AVERAGE
1	244811	0.0	97.8	93.5	99.5	99.1	99.2	100.0	98.2
3	362252	0.	98.8	96.2	99.1	99.4	99.4	100.0	98.8
6	264368	0.	99.0	96.9	99.0	99.5	99.4	100.0	99.0
7	256227	0.0	97.9	93.2	99.2	99.1	99.1	100.0	98.1
10	424715	0.	99.0	96.3	99.0	99.3	99.3	100.0	98.8
12	336007	0.	98.4	95.6	99.4	99.5	99.5	100.0	98.7
24	157831	0.	99.4	97.2	99.1	99.5	99.5	100.0	99.1
25	71985	0.	99.1	96.6	99.1	99.5	99.5	100.0	99.0
74	215192	0.	99.0	96.9	99.4	99.7	99.7	100.0	99.1
94	407382	0.	99.8	97.8	99.7	99.7	99.7	100.0	99.5
135	161541	0.0	97.5	91.1	99.3	98.8	98.9	100.0	97.6
148	520343	0.0	98.2	89.7	99.0	97.9	98.0	100.0	97.1
149	191030	0.	98.3	85.3	99.6	98.8	98.7	100.0	96.8
150	106538	0.0	97.9	98.0	97.7	99.1	99.1	100.0	98.7
151	26556	0.0	98.2	94.7	99.1	99.3	99.4	100.0	98.5
152	196279	0.0	98.3	88.7	99.2	96.1	96.5	100.0	96.5
159	423744	0.0	98.4	89.0	99.4	98.8	98.7	100.0	97.4
37	132985	0.	98.9	96.3	99.1	99.4	99.5	100.0	98.9
38	67174	0.0	97.9	92.6	99.0	98.8	98.9	100.0	97.9
39	65183	0.	98.7	96.1	99.0	99.4	99.5	100.0	98.8
40	325222	0.	99.5	97.2	99.4	99.2	99.3	100.0	99.1
41	141252	0.	98.9	97.0	99.2	99.7	99.7	100.0	99.1
42	88648	0.	96.9	96.3	99.4	99.5	99.5	100.0	98.9
43	235700	0.	98.8	96.3	99.1	99.5	99.5	100.0	98.9
44	46377	0.	99.1	96.7	99.0	99.6	99.6	100.0	99.0
45	66371	0.	98.5	94.1	98.2	99.5	99.5	100.0	98.3
46	50521	0.	99.0	95.4	98.5	99.5	99.5	100.0	98.7
153	13672	0.0	97.8	93.6	98.8	97.7	98.0	100.0	97.6

REGION -W.N.C. ATTACK 13 INTEGRATED DOSE INTERVAL=0-999

POPULATION ITEM	TOTALS	PROMPT	15 DEC 51	25 DEC 51	15 MAY 51	15 JUN 51	5 JUL 52	25 NOV 50	SIX WIND AVERAGE
1	509674	0.7	78.9	75.8	74.1	78.8	79.1	78.2	77.5
3	153950	0.5	73.3	84.8	79.3	89.6	87.9	84.0	83.1
6	90463	0.4	71.2	87.1	80.8	93.2	89.9	85.4	84.6
7	282916	0.5	78.6	81.1	77.0	84.6	86.9	83.2	81.9
10	175861	0.6	72.3	85.0	79.1	90.1	88.1	84.4	83.1
12	172061	0.5	75.0	84.7	79.4	89.0	88.3	84.3	83.5
24	44979	0.5	70.9	87.0	81.3	93.1	90.1	84.4	84.5
25	25952	0.5	72.1	85.9	80.1	91.2	88.7	84.1	83.7
74	92623	0.4	74.5	85.6	80.3	91.6	89.8	82.1	84.0
94	86723	0.4	71.8	87.4	83.1	96.2	90.7	88.3	86.2
135	440663	0.8	78.5	77.2	73.4	79.4	79.8	77.2	77.6
148	779900	0.5	82.0	81.4	76.5	86.9	88.5	83.6	83.2
149	247491	0.8	80.6	77.1	73.6	82.6	86.3	79.5	80.0
150	64587	0.3	75.2	88.0	84.0	85.1	88.5	85.2	84.3
151	32569	0.2	77.3	87.1	81.1	88.9	91.1	85.7	85.2
152	435310	0.4	84.2	82.5	76.7	89.5	89.6	85.4	84.7
159	263030	0.5	81.3	78.3	75.2	84.8	87.2	82.3	81.5
37	55582	0.5	73.2	85.1	79.7	90.4	88.6	84.2	83.5
38	89565	0.5	79.3	81.2	77.2	85.4	87.4	83.4	82.3
39	31439	0.6	72.1	84.7	77.8	89.0	87.7	83.7	82.5
40	51123	0.5	67.5	86.0	81.1	95.1	89.1	88.3	84.5
41	32455	0.4	74.2	88.2	81.7	92.9	90.9	85.9	85.7
42	41699	0.5	73.3	86.9	79.2	90.6	89.1	83.1	83.7
43	108469	0.5	72.5	85.4	79.7	90.0	88.6	83.4	83.3
44	21644	0.4	70.6	85.2	79.9	93.2	90.5	83.5	83.8
45	32497	0.4	72.6	83.9	79.4	89.6	88.1	85.6	83.2
46	23261	0.5	71.4	84.0	79.0	90.0	87.0	82.3	82.3
153	26376	0.5	80.1	80.4	77.1	85.2	84.5	82.0	81.6

REGION -S.CEN. ATTACK 13 INTEGRATED DOSE INTERVAL=0-999

POPULATION ITEM	TOTALS	PROMPT	15 DEC 51	25 DEC 51	15 MAY 51	15 JUN 51	5 JUL 52	25 NOV 50	SIX WIND AVERAGE
1	429332	0.3	94.0	97.9	94.9	90.7	89.8	86.5	92.3
3	169520	1.2	94.1	97.1	90.4	78.3	86.4	87.8	89.0
6	114777	1.4	96.2	97.7	89.0	75.3	86.2	90.1	89.1
7	151832	0.5	86.5	94.4	92.9	85.0	89.1	81.4	88.2
10	202207	1.2	94.5	97.2	90.5	77.6	86.5	89.0	89.7
12	142979	1.0	92.8	97.0	91.0	80.1	85.7	85.3	88.6
24	44549	1.3	96.2	98.0	86.5	77.5	87.1	89.4	89.1
25	25801	1.2	95.3	97.6	88.4	77.4	86.4	88.6	89.0
74	98472	1.2	95.8	97.9	85.5	78.1	87.1	88.1	88.8
94	71366	1.3	96.8	97.9	85.6	80.0	89.2	89.4	89.8
135	321592	0.3	94.6	98.1	95.8	91.5	91.4	88.4	93.3
148	365893	0.4	88.6	94.7	94.5	86.9	90.6	85.5	90.1
149	205064	0.3	86.9	92.2	95.0	86.4	92.6	84.6	89.6
150	20712	0.7	89.9	97.9	91.7	84.7	85.8	86.1	89.3
151	22774	0.8	73.3	95.2	90.1	91.9	83.5	85.9	86.7
152	117907	0.4	94.4	98.3	94.9	87.2	89.4	86.9	91.9
159	133425	0.4	86.1	92.9	94.8	84.7	89.8	80.6	88.1
37	56573	1.1	94.5	97.3	89.4	78.6	86.6	88.1	89.1
38	53441	0.4	86.5	94.8	93.6	86.5	90.6	85.0	89.8
39	42628	1.1	95.0	97.6	89.4	79.1	87.2	89.0	89.5
40	41752	1.4	94.3	96.7	83.5	74.7	84.5	83.7	86.2
41	49790	1.1	94.8	97.6	88.9	81.4	88.0	89.2	90.0
42	42478	1.3	95.6	97.8	88.8	78.9	86.2	88.2	89.2
43	117375	1.2	95.0	97.5	89.1	78.2	86.7	88.8	89.2
44	21910	1.2	96.2	97.9	83.7	76.1	86.1	89.2	88.2
45	32287	1.1	94.4	97.6	92.0	77.8	87.0	88.2	89.5
46	28182	1.5	95.7	97.7	91.4	69.5	82.1	89.6	87.7
153	14690	0.4	93.7	98.2	94.9	88.7	89.0	85.7	91.7

REGION -MOUNT. ATTACK 13 INTEGRATED DOSE INTERVAL=0-999

POPULATION ITEM	TOTALS	PROMPT	15 DEC 51	25 DEC 51	15 MAY 51	15 JUN 51	5 JUL 52	25 NOV 50	SIX WIND AVERAGE
1	856956	0.3	93.3	94.9	92.0	90.9	92.3	92.8	92.7
3	68547	1.1	91.7	92.5	88.7	86.7	79.1	91.8	88.4
6	46012	1.4	90.8	91.6	87.7	85.4	76.0	90.7	87.0
7	57070	0.4	92.4	95.3	92.5	91.7	90.7	93.8	92.7
10	67708	1.0	92.1	92.7	89.1	87.1	79.2	92.5	88.8
12	52764	1.4	91.2	92.7	89.1	87.1	81.3	91.3	88.8
24	23418	1.1	91.8	92.7	88.0	84.9	78.3	90.7	87.7
25	12139	1.2	91.5	92.5	88.1	85.4	78.8	91.1	87.9
74	35254	1.6	90.9	93.0	88.3	85.5	79.9	90.2	88.0
94	20764	1.3	92.6	94.3	91.0	88.6	81.0	93.3	90.1
135	413186	0.5	89.9	92.4	88.2	89.1	91.8	91.4	90.5
148	235616	0.5	89.3	94.1	91.1	88.8	82.1	91.0	89.4
149	98287	0.5	87.4	91.4	90.3	87.7	75.6	89.6	87.0
150	15279	0.3	97.9	98.7	94.1	95.4	86.1	97.0	94.8
151	4870	0.6	88.8	91.1	91.4	88.1	84.8	92.6	89.5
152	117207	0.4	89.8	95.9	91.3	88.9	87.0	91.4	90.7
159	50553	0.5	85.6	93.5	94.1	85.6	71.2	88.2	86.4
37	23309	1.1	91.9	92.9	89.2	86.8	79.9	91.7	88.7
38	22353	0.4	90.7	94.4	91.8	89.9	82.6	92.2	90.3
39	18373	1.1	91.7	92.3	87.6	85.4	76.9	91.1	87.5
40	16743	0.7	93.7	94.0	91.6	90.3	77.5	93.9	90.1
41	12762	1.0	93.2	95.3	92.7	90.6	84.2	95.0	91.8
42	18568	0.9	91.9	93.6	90.4	87.1	83.4	92.0	89.7
43	46771	1.1	91.3	92.9	89.0	86.7	79.9	91.4	88.5
44	9534	1.4	90.9	92.4	87.9	85.7	75.1	90.7	87.1
45	15536	1.5	90.9	91.1	87.9	86.9	79.6	91.1	87.9
46	16077	1.4	92.5	91.7	88.1	86.9	81.1	92.0	88.7
153	10596	0.4	90.4	94.9	89.8	89.1	90.4	91.5	91.0

REGION -N.WEST ATTACK 13 INTEGRATED DOSE INTERVAL=0-999

POPULATION ITEM	TOTALS	PROMPT	15 DEC 51	25 DEC 51	15 MAY 51	15 JUN 51	5 JUL 52	25 NOV 50	SIX WIND AVERAGE
1	162957	0.2	99.9	99.9	99.9	99.9	99.9	99.9	99.8
3	46222	0.3	99.7	99.7	99.7	99.7	99.7	99.7	99.7
6	30440	0.3	99.7	99.7	99.7	99.7	99.7	99.7	99.7
7	30091	0.3	99.7	99.7	99.7	99.7	99.7	99.7	99.7
10	50088	0.4	99.6	99.6	99.6	99.6	99.6	99.6	99.6
12	46262	0.3	99.7	99.7	99.7	99.7	99.7	99.7	99.7
24	18408	0.3	99.7	99.7	99.7	99.7	99.7	99.7	99.7
25	9248	0.3	99.7	99.7	99.7	99.7	99.7	99.7	99.7
74	24168	0.2	99.8	99.8	99.8	99.8	99.8	99.8	99.8
94	32311	0.2	99.8	99.8	99.8	99.8	99.8	99.8	99.8
135	62429	0.2	99.8	99.8	99.8	99.8	99.8	99.8	99.8
148	98111	0.2	99.8	99.8	99.8	99.8	99.8	99.8	99.8
149	57546	0.2	99.8	99.8	99.8	99.8	99.8	99.8	99.8
150	11300	0.4	99.6	99.6	99.6	99.6	99.6	99.6	99.6
151	5946	0.4	99.6	99.6	99.6	99.6	99.6	99.6	99.6
152	23327	0.1	99.9	99.9	99.9	99.9	99.9	99.9	99.9
159	36570	0.2	99.8	99.8	99.8	99.8	99.8	99.8	99.8
37	16370	0.3	99.7	99.7	99.7	99.7	99.7	99.7	99.7
38	10772	0.2	99.8	99.8	99.8	99.8	99.8	99.8	99.8
39	10764	0.3	99.7	99.7	99.7	99.7	99.7	99.7	99.7
40	27160	0.4	99.6	99.6	99.6	99.6	99.6	99.6	99.6
41	12484	0.3	99.7	99.7	99.7	99.7	99.7	99.7	99.7
42	12767	0.3	99.7	99.7	99.7	99.7	99.7	99.7	99.7
43	32594	0.3	99.7	99.7	99.7	99.7	99.7	99.7	99.7
44	6689	0.3	99.7	99.7	99.7	99.7	99.7	99.7	99.7
45	10321	0.3	99.7	99.7	99.7	99.7	99.7	99.7	99.6
46	8344	0.4	99.6	99.6	99.6	99.6	99.6	99.6	99.8
153	2504	0.2	99.8	99.8	99.8	99.8	99.8	99.8	

POPULATION ITEM	TOTALS	PROMPT	15 DEC 51	25 DEC 51	15 MAY 51	15 JUN 51	5 JUL 52	25 NOV 50	SIX WIND AVERAGE
	U. S. TOTALS			ATTACK 13		INTEGRATED DOSE INTERVAL=0-2999			
1	2971499	0.4	98.5	98.2	97.6	96.7	97.4	97.2	97.6
3	1784656	1.2	97.4	98.2	97.7	95.9	95.6	96.9	96.9
6	1246526	1.5	97.0	98.1	97.6	95.4	95.1	96.6	96.6
7	1343059	0.3	98.2	97.9	97.7	97.0	97.5	97.6	97.6
10	2019872	1.3	97.3	98.2	97.5	95.7	95.5	96.7	96.8
12	1653024	1.0	97.8	98.2	98.0	96.6	95.9	97.3	97.3
24	675084	1.6	97.2	98.1	97.5	95.3	95.6	96.5	96.7
25	329959	1.4	97.3	98.1	97.6	95.7	95.5	96.8	96.8
74	1103668	1.2	97.8	98.2	98.1	96.8	98.3	97.6	97.8
94	1387922	0.7	98.5	98.9	98.9	97.4	96.7	98.1	98.1
135	1750307	0.4	98.1	97.6	96.9	95.7	96.6	96.9	97.0
148	3039695	0.4	97.9	97.6	97.7	96.3	96.9	96.8	97.2
149	1331375	0.4	97.1	97.0	97.8	95.4	96.4	95.8	96.6
150	401179	0.3	98.2	99.1	98.4	97.5	97.7	98.4	98.2
151	225141	0.4	97.4	98.9	98.5	97.5	96.7	96.8	97.6
152	1076563	0.3	98.8	97.6	97.2	96.9	97.2	97.5	97.5
159	1961169	0.3	98.4	97.8	97.8	97.1	97.1	97.6	97.6
37	642352	1.2	97.5	98.2	97.8	96.2	95.8	97.1	97.1
38	424202	0.4	97.9	97.9	97.7	96.5	97.2	97.1	97.4
39	379219	1.3	97.1	98.1	97.4	95.3	95.4	96.5	96.6
40	982094	0.8	98.3	98.9	98.6	97.2	96.3	97.6	97.8
41	765932	0.7	98.5	98.9	98.6	97.5	96.5	98.1	98.0
42	443688	1.1	97.6	98.4	97.9	96.2	96.1	97.4	97.3
43	1174589	1.2	97.5	98.3	97.8	96.1	95.7	97.1	97.1
44	268623	1.3	97.4	98.2	97.8	96.0	95.6	97.1	97.0
45	337926	1.3	97.4	98.0	97.5	95.6	95.5	96.9	96.8
46	317218	3.9	94.5	95.5	94.4	92.0	92.4	94.0	93.8
153	92303	0.3	98.5	97.9	97.3	96.6	97.0	97.5	97.5

POPULATION ITEM	TOTALS	PROMPT	15 DEC 51	25 DEC 51	15 MAY 51	15 JUN 51	5 JUL 52	25 NOV 50	SIX WIND AVERAGE
	REGION -N.EAST			ATTACK 13		INTEGRATED DOSE INTERVAL=0-2999			
1	163593	0.3	99.7	99.7	99.7	99.6	98.7	98.8	99.4
3	446779	0.4	99.6	99.6	99.6	99.4	95.7	98.7	98.8
6	357939	0.4	99.6	99.6	99.6	99.4	95.7	99.0	98.8
7	91118	0.4	99.6	99.6	99.6	99.5	98.8	97.3	99.1
10	465707	0.5	99.5	99.5	99.5	99.4	95.5	98.6	98.7
12	449988	0.4	99.6	99.6	99.6	99.4	95.5	98.8	98.7
24	204904	0.4	99.6	99.6	99.6	99.5	95.9	99.1	98.9
25	93456	0.4	99.6	99.6	99.6	99.4	95.9	98.8	98.8
74	384765	0.2	99.8	99.8	99.8	99.7	98.1	99.5	99.5
94	452761	0.4	99.6	99.6	99.6	99.6	95.6	98.7	98.8
135	56329	0.3	99.7	99.7	99.7	99.6	99.0	98.2	99.3
148	229209	0.5	99.5	99.5	99.5	99.3	98.5	97.7	99.0
149	66431	0.8	99.2	99.2	99.2	98.9	98.6	97.5	98.8
150	96556	0.3	99.7	99.7	99.7	99.6	98.5	98.6	99.3
151	40137	0.7	99.3	99.3	99.3	99.2	97.9	96.8	98.6
152	26105	0.3	99.7	99.7	99.7	99.6	98.8	96.0	98.9
159	164942	0.6	99.4	99.4	99.4	99.2	98.9	96.5	98.8
37	170972	0.4	99.6	99.6	99.6	99.5	95.7	98.7	98.8
38	34351	0.5	99.5	99.5	99.5	99.3	98.6	97.8	99.0
39	67191	0.4	99.6	99.6	99.6	99.4	95.8	98.6	98.7
40	305611	0.4	99.6	99.6	99.6	99.6	95.0	98.7	98.7
41	265616	0.4	99.6	99.6	99.6	99.5	95.1	98.5	98.6
42	118945	0.3	99.7	99.7	99.7	99.6	96.6	98.8	99.0
43	297900	0.4	99.6	99.6	99.6	99.5	95.9	98.8	98.8
44	66053	0.4	99.6	99.6	99.6	99.6	96.1	99.1	99.0
45	82973	0.5	99.5	99.5	99.5	99.4	95.3	98.9	98.7
46	77800	0.5	99.5	99.5	99.5	99.1	95.8	97.8	98.5
153	5010	0.2	99.8	99.8	99.8	99.7	99.1	98.0	99.3

REGION -S.EAST ATTACK 13 INTEGRATED DOSE INTERVAL=0-2999

POPULATION ITEM	TOTALS	PROMPT	15 DEC 51	25 DEC 51	15 MAY 51	15 JUN 51	5 JUL 52	25 NOV 50	SIX WIND AVERAGE
1	447603	0.2	98.5	99.0	97.7	98.5	98.4	98.3	98.4
3	360213	2.7	95.0	96.9	94.8	94.4	93.5	96.2	95.1
6	206811	4.6	92.5	95.2	93.1	92.0	90.5	95.0	93.0
7	440215	0.2	97.6	98.7	97.0	98.1	98.3	97.2	97.8
10	439169	2.7	94.8	97.0	94.5	94.0	93.2	96.1	94.9
12	315169	2.2	95.7	97.2	95.9	95.7	94.5	96.6	95.9
24	93789	6.1	91.9	93.8	90.4	89.7	90.2	93.2	91.5
25	55109	4.2	93.6	95.5	93.1	92.4	91.7	95.0	93.6
74	152237	5.2	92.2	94.5	93.5	92.6	91.8	94.1	93.1
94	195435	1.3	96.5	98.5	97.6	97.3	96.2	98.1	97.3
135	230925	0.1	98.1	98.7	97.7	98.4	98.2	97.8	98.2
148	528412	0.2	98.3	98.5	97.0	97.2	96.9	95.7	97.3
149	293619	0.2	98.0	98.3	96.7	96.9	97.1	94.5	96.9
150	53851	0.3	98.1	99.0	94.7	94.8	95.4	97.4	96.5
151	71310	0.1	99.6	99.7	99.0	98.8	95.3	95.7	98.0
152	103448	0.2	98.3	97.8	97.1	98.1	98.2	97.9	97.9
159	778310	0.2	98.5	99.0	96.7	97.8	97.2	98.1	97.9
37	128971	3.1	94.6	96.5	94.5	94.2	93.4	95.9	94.9
38	120665	0.3	97.8	98.6	96.9	97.5	97.8	96.5	97.5
39	87450	2.8	95.1	96.9	94.7	94.2	93.2	96.3	95.1
40	122760	1.6	96.2	98.2	96.2	96.3	94.9	97.7	96.6
41	183746	1.2	97.0	98.5	97.2	97.4	96.5	98.1	97.5
42	61201	3.2	93.9	96.6	94.4	93.6	92.7	96.1	94.5
43	227604	2.8	94.6	96.8	95.0	94.4	93.0	96.3	95.0
44	45079	4.1	93.3	95.7	93.7	92.9	92.2	95.3	93.8
45	66285	3.3	94.8	96.3	94.3	93.8	93.6	95.8	94.8
46	77608	12.4	85.9	87.5	82.8	81.1	82.8	87.1	84.5
153	13755	0.1	98.1	98.6	97.6	98.3	98.2	98.1	98.1

REGION -E.N.C. ATTACK 13 INTEGRATED DOSE INTERVAL=0-2999

POPULATION ITEM	TOTALS	PROMPT	15 DEC 51	25 DEC 51	15 MAY 51	15 JUN 51	5 JUL 52	25 NOV 50	SIX WIND AVERAGE
1	244811	0.0	100.0	99.1	100.0	100.0	100.0	100.0	99.8
3	362252	0.	100.0	99.4	99.7	100.0	100.0	100.0	99.9
6	264366	0.	100.0	99.3	99.7	100.0	100.0	100.0	99.8
7	256227	0.0	100.0	99.1	100.0	100.0	100.0	100.0	99.8
10	424715	0.	100.0	99.4	99.6	100.0	100.0	100.0	99.8
12	336007	0.	100.0	99.2	99.9	100.0	100.0	100.0	99.9
24	157831	0.	100.0	99.5	99.7	100.0	100.0	100.0	99.9
25	71985	0.	100.0	99.4	99.8	100.0	100.0	100.0	99.9
74	215192	0.	100.0	99.2	100.0	100.0	100.0	100.0	99.9
94	407362	0.	100.0	99.4	100.0	100.0	100.0	100.0	99.9
135	161541	0.0	100.0	98.7	100.0	100.0	100.0	100.0	99.8
148	520343	0.0	100.0	98.6	100.0	100.0	100.0	100.0	99.7
149	191030	0.	100.0	97.8	100.0	100.0	100.0	100.0	99.6
150	106538	0.0	100.0	99.9	100.0	100.0	100.0	100.0	100.0
151	26556	0.0	100.0	99.5	100.0	100.0	100.0	100.0	99.9
152	190279	0.0	100.0	98.5	100.0	100.0	100.0	100.0	99.7
159	423744	0.0	100.0	98.8	100.0	100.0	100.0	100.0	99.8
37	132985	0.	100.0	99.3	99.8	100.0	100.0	100.0	99.9
38	67174	0.0	100.0	98.9	100.0	100.0	100.0	100.0	99.8
39	65163	0.	100.0	99.3	99.8	100.0	100.0	100.0	99.8
40	325222	0.	100.0	99.6	99.6	100.0	100.0	100.0	99.9
41	141252	0.	100.0	99.4	99.9	100.0	100.0	100.0	99.9
42	68648	0.	100.0	99.2	99.8	100.0	100.0	100.0	99.8
43	235700	0.	100.0	99.3	99.8	100.0	100.0	100.0	99.8
44	48377	0.	100.0	99.1	99.8	100.0	100.0	100.0	99.8
45	66371	0.	100.0	99.3	99.9	100.0	100.0	100.0	99.9
46	50521	0.	100.0	98.5	99.8	100.0	100.0	100.0	99.7
153	13672	0.0	100.0	99.1	100.0	100.0	100.0	100.0	99.8

REGION -W.N.C. ATTACK 13 INTEGRATED DOSE INTERVAL=0-2999

POPULATION ITEM	TOTALS	PROMPT	15 DEC 51	25 DEC 51	15 MAY 51	15 JUN 51	5 JUL 52	25 NOV 50	SIX WIND AVERAGE
1	509674	0.7	98.7	95.3	94.1	92.3	93.5	95.6	94.9
3	153950	0.5	99.2	96.3	96.1	95.2	94.2	98.2	96.6
6	90463	0.4	99.3	97.2	97.1	96.3	94.5	98.6	97.2
7	282916	0.5	99.2	95.3	95.5	93.9	95.0	97.5	96.1
10	175861	0.6	99.2	96.7	96.2	95.5	94.3	98.1	96.7
12	172061	0.5	99.2	95.6	96.0	94.8	94.7	98.5	96.4
24	44979	0.5	99.3	97.4	97.1	96.6	94.5	98.5	97.2
25	25952	0.5	99.2	96.8	96.5	95.8	94.2	98.4	96.8
74	92623	0.4	99.3	96.5	96.6	96.0	94.9	98.5	97.0
94	86723	0.4	99.4	97.9	98.4	97.6	93.4	99.4	97.7
135	440663	0.8	98.6	95.1	93.8	91.9	93.2	95.2	94.6
148	779900	0.5	99.2	95.8	95.1	94.3	95.4	97.4	96.2
149	247491	0.8	98.8	94.8	94.6	91.5	94.0	95.8	94.9
150	64567	0.3	99.5	97.0	96.6	94.3	96.2	97.8	96.9
151	32569	0.2	99.5	97.4	96.9	95.6	95.9	98.7	97.3
152	435310	0.4	99.4	96.1	95.0	95.9	96.0	98.1	96.7
159	263030	0.5	99.2	92.6	95.3	91.7	93.9	96.8	94.9
37	55582	0.5	99.2	96.4	96.4	95.4	94.6	98.3	96.7
38	69565	0.5	99.2	95.6	95.6	94.1	95.2	97.4	96.2
39	31439	0.6	99.2	95.8	95.7	94.8	94.5	98.2	96.4
40	51123	0.5	99.3	97.3	97.9	97.3	91.6	99.3	97.1
41	52455	0.4	99.3	96.8	97.2	95.9	95.7	99.0	97.3
42	41699	0.5	99.2	96.9	96.4	95.2	95.1	98.3	96.9
43	106469	0.5	99.2	96.7	96.2	95.1	94.6	98.2	96.7
44	21644	0.4	99.4	97.0	97.2	96.6	95.0	98.4	97.3
45	32497	0.4	99.2	95.4	95.3	95.2	94.6	98.0	96.3
46	23281	0.5	99.2	95.6	96.5	95.5	94.2	98.2	96.6
153	28376	0.5	99.1	95.4	94.6	94.1	94.6	97.0	95.8

REGION -S.CEN. ATTACK 13 INTEGRATED DOSE INTERVAL=0-2999

POPULATION ITEM	TOTALS	PROMPT	15 DEC 51	25 DEC 51	15 MAY 51	15 JUN 51	5 JUL 52	25 NOV 50	SIX WIND AVERAGE
1	429332	0.3	98.1	98.7	98.5	96.4	96.9	97.9	97.7
3	169520	1.2	97.3	97.7	98.4	94.2	95.2	96.8	96.6
6	114777	1.4	97.6	98.0	98.5	94.0	95.3	97.1	96.7
7	151832	0.5	95.7	96.1	98.1	92.9	95.2	96.0	95.6
10	202207	1.2	97.2	97.6	98.5	94.1	95.4	96.8	96.6
12	142979	1.0	97.2	97.8	98.3	94.3	94.8	96.6	96.5
24	44549	1.3	97.6	98.2	98.6	94.4	95.5	97.2	96.9
25	25801	1.2	97.5	98.0	98.5	94.2	95.3	97.0	96.8
74	98472	1.2	97.5	98.2	98.6	94.4	95.6	97.8	97.0
94	71366	1.3	98.0	98.1	98.6	94.9	95.8	95.9	96.9
135	321592	0.3	98.2	98.7	98.9	96.4	97.3	98.0	97.9
148	305893	0.4	95.9	95.7	99.0	92.9	96.1	96.4	96.0
149	205064	0.3	95.7	93.3	99.5	91.1	96.1	95.1	95.1
150	20712	0.7	95.9	99.0	98.2	95.3	93.9	97.4	96.6
151	22774	0.8	87.9	96.9	95.9	96.5	96.4	98.6	95.4
152	117907	0.4	98.0	99.1	99.0	94.9	96.5	98.2	97.6
159	133425	0.4	95.5	94.5	99.0	90.9	94.2	93.8	94.6
37	56573	1.1	97.4	97.8	98.5	94.3	95.2	96.9	96.7
38	53441	0.4	96.1	96.2	98.6	93.6	96.0	96.5	96.2
39	42528	1.1	97.6	98.1	98.5	94.3	95.3	97.1	96.8
40	41752	1.4	97.5	97.4	98.1	94.2	94.6	96.2	96.3
41	49790	1.1	97.5	98.1	98.7	94.5	95.4	96.4	96.8
42	42478	1.3	97.6	98.1	98.5	94.4	94.9	97.0	96.7
43	117375	1.2	97.6	97.9	98.5	94.2	95.4	97.1	96.8
44	21910	1.2	97.9	98.2	98.6	93.8	95.1	97.3	96.8
45	32267	1.1	97.2	98.1	98.6	94.3	94.7	97.3	96.7
46	26182	1.5	97.6	97.9	98.3	94.3	94.7	97.1	96.7
153	14690	0.4	97.8	99.2	98.8	96.1	96.4	97.9	97.7

REGION -MOUNT. ATTACK 13 INTEGRATED DOSE INTERVAL=0-2999

POPULATION ITEM	TOTALS	PROMPT	15 DEC 51	25 DEC 51	15 MAY 51	15 JUN 51	5 JUL 52	25 NOV 50	SIX WIND AVERAGE
1	856956	0.3	97.9	98.4	97.2	96.8	98.1	96.7	97.5
3	68547	1.1	94.2	98.8	93.6	93.5	94.2	93.7	94.7
6	46012	1.4	93.0	98.6	92.0	92.4	92.9	92.6	93.6
7	57070	0.4	98.4	98.8	97.1	96.6	98.0	96.6	97.6
10	67708	1.0	94.5	98.9	93.9	93.9	94.4	94.1	95.0
12	52764	1.4	94.2	98.5	93.3	93.2	94.4	93.6	94.5
24	23418	1.1	94.1	98.8	93.4	93.6	94.3	93.6	94.6
25	12139	1.2	94.0	98.7	93.2	93.3	94.1	93.5	94.5
74	35254	1.6	94.3	98.3	92.8	93.3	94.4	93.4	94.4
94	20764	1.3	94.6	98.7	92.4	94.4	94.5	94.4	94.8
135	413166	0.5	96.8	97.5	95.6	94.9	97.1	96.3	96.4
148	235616	0.5	97.8	98.3	96.5	95.4	96.1	93.9	96.3
149	96267	0.5	97.2	98.0	96.0	95.0	93.6	91.9	95.3
150	15279	0.3	99.3	99.5	98.7	98.9	99.4	98.8	99.1
151	4870	0.6	94.7	99.1	94.5	93.7	93.9	93.7	94.9
152	117207	0.4	98.2	98.4	96.7	95.3	97.9	95.0	96.9
159	50553	0.5	96.9	98.0	96.2	95.7	93.5	89.8	95.0
37	23309	1.1	94.5	98.8	93.8	93.8	94.5	93.9	94.9
38	22353	0.4	97.8	98.5	96.5	96.1	97.0	94.9	96.8
39	18375	1.1	93.8	98.8	93.0	93.2	93.9	93.3	94.3
40	16743	0.7	94.4	99.3	93.8	94.3	94.8	94.7	95.2
41	12782	1.0	96.3	98.9	95.3	95.9	96.4	96.1	96.5
42	18568	0.9	95.2	99.0	94.3	94.5	95.4	94.3	95.5
43	40771	1.1	94.4	98.8	93.5	93.6	94.5	93.6	94.7
44	9534	1.4	93.4	98.6	92.3	92.9	93.4	92.9	93.9
45	15536	1.5	93.3	98.4	92.7	92.6	93.3	92.8	93.9
46	16077	1.4	94.4	98.5	94.3	93.8	95.1	94.0	95.0
153	10596	0.4	98.0	98.2	96.2	95.3	98.2	95.7	96.9

REGION -N.WEST ATTACK 13 INTEGRATED DOSE INTERVAL=0-2999

POPULATION ITEM	TOTALS	PROMPT	15 DEC 51	25 DEC 51	15 MAY 51	15 JUN 51	5 JUL 52	25 NOV 50	SIX WIND AVERAGE
1	162957	0.2	99.9	99.9	99.9	99.9	99.9	99.9	99.8
3	46222	0.3	99.7	99.7	99.7	99.7	99.7	99.7	99.7
6	30440	0.3	99.7	99.7	99.7	99.7	99.7	99.7	99.7
7	30091	0.3	99.7	99.7	99.7	99.7	99.7	99.7	99.7
10	50088	0.4	99.6	99.6	99.6	99.6	99.6	99.6	99.6
12	46262	0.3	99.7	99.7	99.7	99.7	99.7	99.7	99.7
24	18408	0.3	99.7	99.7	99.7	99.7	99.7	99.7	99.7
25	9248	0.3	99.7	99.7	99.7	99.7	99.7	99.7	99.7
74	24168	0.2	99.8	99.8	99.8	99.8	99.8	99.8	99.8
94	32311	0.2	99.8	99.8	99.8	99.8	99.8	99.8	99.8
135	62429	0.2	99.8	99.8	99.8	99.8	99.8	99.8	99.8
148	98111	0.2	99.8	99.8	99.8	99.8	99.8	99.8	99.8
149	57546	0.2	99.8	99.8	99.8	99.8	99.8	99.8	99.8
150	11300	0.4	99.6	99.6	99.6	99.6	99.6	99.6	99.6
151	5946	0.4	99.6	99.6	99.6	99.6	99.6	99.6	99.6
152	23327	0.1	99.9	99.9	99.9	99.9	99.9	99.9	99.9
159	36570	0.2	99.8	99.8	99.8	99.8	99.8	99.8	99.8
37	16370	0.3	99.7	99.7	99.7	99.7	99.7	99.7	99.7
38	10772	0.2	99.8	99.8	99.8	99.8	99.8	99.8	99.8
39	10784	0.3	99.7	99.7	99.7	99.7	99.7	99.7	99.7
40	27160	0.4	99.6	99.6	99.6	99.6	99.6	99.6	99.6
41	12484	0.3	99.7	99.7	99.7	99.7	99.7	99.7	99.7
42	12767	0.3	99.7	99.7	99.7	99.7	99.7	99.7	99.7
43	32594	0.3	99.7	99.7	99.7	99.7	99.7	99.7	99.7
44	6889	0.3	99.7	99.7	99.7	99.7	99.7	99.7	99.7
45	10321	0.3	99.7	99.7	99.7	99.7	99.7	99.7	99.7
46	8344	0.4	99.6	99.6	99.6	99.6	99.6	99.6	99.6
153	2504	0.2	99.8	99.8	99.8	99.8	99.8	99.8	99.8

U. S. TOTALS ATTACK 23 INTEGRATED DOSE INTERVAL=0-999

POPULATION ITEM	TOTALS	PROMPT	15 DEC 51	25 DEC 51	15 MAY 51	15 JUN 51	5 JUL 52	25 NOV 50	SIX WIND AVERAGE
1	2971499	0.4	95.1	94.2	89.1	88.4	89.3	90.1	91.0
3	1784656	9.3	82.5	82.4	65.5	61.0	63.1	68.7	70.5
6	1246526	12.6	78.0	78.2	58.9	51.7	54.7	62.0	63.9
7	1343059	0.4	96.2	93.1	84.9	86.5	88.7	88.8	89.7
10	2019872	9.0	82.6	82.5	65.4	61.6	63.7	68.8	70.8
12	1653024	9.4	82.6	82.8	67.4	61.9	64.3	69.6	71.4
24	675084	11.1	78.8	79.1	58.9	51.3	56.2	60.9	64.2
25	329959	10.5	80.2	80.4	62.5	55.7	59.0	64.8	67.1
74	1103668	14.6	78.9	78.0	62.2	44.8	49.0	63.9	62.8
94	1387922	11.4	80.1	80.7	65.2	55.5	59.7	62.0	67.2
135	1750307	0.3	96.7	94.8	89.4	89.2	90.9	92.4	92.2
148	3039695	0.7	93.4	91.4	82.1	83.8	85.9	87.3	87.3
149	1331375	0.8	92.6	90.5	77.9	82.7	85.1	86.8	85.9
150	401179	0.8	92.8	92.6	84.6	82.4	84.4	82.4	86.5
151	225141	0.8	89.2	89.0	78.4	80.5	80.0	81.7	83.2
152	1076563	0.4	95.4	92.4	86.9	86.3	88.8	90.9	90.1
159	1961169	0.6	94.2	91.1	79.7	83.9	85.6	86.0	86.8
37	642352	9.8	81.9	81.8	64.9	59.2	61.8	67.5	69.5
38	424202	0.7	93.7	91.6	82.2	83.8	85.7	86.6	87.3
39	379219	8.7	82.4	82.0	65.3	61.6	62.9	69.8	70.7
40	982094	9.6	80.4	81.5	65.2	59.7	62.9	62.6	68.7
41	765932	9.3	82.8	83.7	65.7	58.4	61.6	67.1	69.9
42	443688	10.8	82.0	81.5	62.2	56.6	59.3	66.7	68.1
43	1174589	10.3	81.6	81.1	63.6	58.5	60.7	67.5	68.8
44	268623	12.9	78.5	77.8	56.7	49.0	52.2	63.7	63.0
45	337926	8.9	82.9	83.1	67.2	62.0	64.9	69.5	71.6
46	317218	14.2	77.3	77.5	56.1	49.9	53.3	61.3	62.6
153	92303	0.4	95.8	93.5	88.1	87.3	89.4	91.0	90.9

REGION -N.EAST ATTACK 23 INTEGRATED DOSE INTERVAL=0-999

POPULATION ITEM	TOTALS	PROMPT	15 DEC 51	25 DEC 51	15 MAY 51	15 JUN 51	5 JUL 52	25 NOV 50	SIX WIND AVERAGE
1	163593	0.9	95.1	96.7	88.8	85.5	83.0	71.4	86.7
3	446779	10.3	81.0	85.6	58.1	43.7	49.2	66.6	64.0
6	357939	12.4	79.6	83.9	52.0	36.5	42.9	65.9	60.1
7	91118	0.9	95.2	96.2	87.7	80.2	81.4	66.3	84.5
10	465707	9.8	80.8	85.7	59.2	45.2	50.8	66.7	64.7
12	449988	10.8	80.1	85.2	59.1	43.5	49.0	65.5	63.7
24	204904	9.6	83.3	86.7	55.2	39.9	46.2	68.6	63.3
25	93456	10.1	81.9	86.0	57.4	41.1	47.1	67.6	63.5
74	384765	15.5	81.0	82.7	57.3	20.3	25.6	71.1	56.3
94	452781	10.8	82.3	86.1	65.2	44.6	50.5	65.1	65.6
135	56329	0.7	96.7	97.1	89.3	84.9	84.5	68.5	86.8
148	229209	1.2	90.8	93.5	83.1	75.6	75.7	66.5	80.9
149	66431	1.8	84.6	89.3	79.6	71.0	72.1	65.5	77.0
150	96556	0.8	96.7	97.7	87.7	82.9	81.1	65.9	85.3
151	40137	1.2	83.8	87.9	75.6	68.5	70.4	69.1	75.9
152	26105	0.8	95.4	97.3	86.6	71.4	73.2	67.3	81.9
159	164942	1.2	87.4	91.5	81.6	76.2	77.6	67.7	80.3
37	170972	10.6	81.1	85.6	57.6	42.0	47.6	66.4	63.4
38	34351	1.6	91.1	94.1	83.0	75.2	76.4	65.2	80.8
39	87191	9.2	80.5	85.3	59.1	45.2	50.7	67.2	64.7
40	305811	8.9	82.0	87.5	64.1	51.2	57.2	67.1	68.2
41	265616	10.5	80.0	85.7	57.7	41.3	45.8	62.1	62.1
42	118945	11.2	82.1	85.2	52.1	38.8	44.9	68.8	62.0
43	297900	11.1	81.1	85.1	54.8	39.4	45.4	66.7	62.1
44	86053	12.5	81.2	84.5	47.4	30.5	37.4	69.7	58.4
45	82973	9.7	81.8	86.3	61.6	45.0	50.7	65.9	65.2
46	77800	12.5	78.8	82.3	51.6	37.0	43.0	64.3	59.5
153	5010	0.7	97.6	98.0	88.9	82.6	82.4	67.6	86.2

POPULATION ITEM	TOTALS	PROMPT	15 DEC 51	25 DEC 51	15 MAY 51	15 JUN 51	5 JUL 52	25 NOV 50	SIX WIND AVERAGE
REGION -S.EAST		ATTACK 23			INTEGRATED DOSE INTERVAL=0-999				
1	447603	0.6	97.0	92.7	81.0	86.8	85.6	90.5	88.9
3	380213	8.2	89.2	85.7	61.8	74.0	62.5	76.2	74.9
6	206811	13.8	84.1	81.2	50.8	65.1	47.3	67.2	66.0
7	440215	0.4	96.8	90.6	79.7	85.4	85.6	87.6	87.6
10	439169	8.4	88.8	85.2	60.3	72.9	61.4	75.7	74.1
12	315169	7.4	90.5	87.2	64.5	77.5	64.8	78.5	77.2
24	93789	13.7	84.2	80.9	47.1	61.1	47.1	62.6	63.8
25	55109	10.9	86.7	83.4	55.5	68.6	54.7	70.3	69.9
74	152237	16.4	81.9	79.1	52.9	65.4	48.2	66.4	65.7
94	195435	10.3	87.8	85.8	58.3	74.7	60.4	70.3	72.9
135	236925	0.4	96.9	92.0	80.7	86.7	85.8	90.9	88.8
148	528412	0.6	96.1	88.4	76.4	85.3	81.0	86.5	85.6
149	293619	0.7	95.7	85.4	73.5	85.9	81.0	85.4	84.5
150	53851	0.9	95.6	91.2	77.5	80.1	74.6	87.0	84.3
151	71310	0.4	96.4	91.0	79.1	85.2	79.3	83.9	85.8
152	103448	0.4	96.9	93.2	80.9	85.6	84.3	90.5	88.6
159	778310	0.6	95.6	87.7	73.5	84.6	81.9	86.3	84.9
37	128971	9.2	88.4	85.0	60.8	73.0	60.9	74.6	73.8
38	120665	0.7	95.9	89.4	77.2	84.9	82.7	86.9	86.2
39	87450	8.4	89.1	85.4	61.1	73.9	60.3	76.7	74.4
40	122760	7.2	90.8	88.7	62.8	75.2	60.3	73.8	75.3
41	183746	6.1	91.0	89.0	68.6	80.8	73.4	79.9	80.4
42	81201	11.2	86.9	83.2	56.2	69.5	53.3	71.0	70.0
43	227604	9.8	87.9	84.1	58.7	72.2	57.4	74.1	72.4
44	45079	13.5	84.5	80.3	50.9	65.7	46.8	68.4	66.1
45	66285	8.9	88.2	85.1	61.6	73.1	63.6	75.0	74.4
46	77608	19.5	77.6	75.1	41.2	50.1	41.6	56.0	56.9
153	13755	0.4	97.1	93.2	82.6	86.4	84.2	92.2	89.3

POPULATION ITEM	TOTALS	PROMPT	15 DEC 51	25 DEC 51	15 MAY 51	15 JUN 51	5 JUL 52	25 NOV 50	SIX WIND AVERAGE
REGION -E.N.C.		ATTACK 23			INTEGRATED DOSE INTERVAL=0-999				
1	244811	0.4	97.8	97.4	89.2	90.5	92.0	89.7	92.8
3	362252	7.4	90.9	90.8	71.6	70.3	80.7	61.5	77.6
6	264368	9.9	88.5	88.6	67.0	63.9	77.8	53.0	73.1
7	256227	0.2	97.8	97.0	88.4	89.4	91.5	89.9	92.3
10	424715	7.3	90.8	91.0	71.1	70.8	80.9	61.4	77.7
12	336007	7.6	91.0	90.6	74.1	71.0	81.2	64.6	78.8
24	157831	8.4	90.2	90.3	65.1	64.4	79.6	51.1	73.5
25	71985	8.0	90.4	90.4	69.0	67.4	80.1	56.9	75.7
74	215192	11.9	87.2	86.8	68.1	54.6	78.1	47.3	70.4
94	407382	9.3	88.8	88.7	70.1	63.8	76.8	57.3	74.3
135	161541	0.2	97.9	97.1	88.7	89.0	91.3	90.2	92.4
148	520343	0.3	98.0	96.5	87.9	88.2	90.4	89.9	91.8
149	191030	0.5	98.1	97.4	84.4	87.4	88.9	86.6	90.5
150	106538	0.2	97.9	94.9	92.4	91.1	93.8	93.6	94.0
151	26556	0.2	96.2	97.8	88.9	91.1	90.8	90.3	92.5
152	196279	0.3	98.3	96.4	88.8	86.9	89.8	91.2	91.9
159	423744	0.3	98.0	97.3	86.6	87.2	90.5	88.5	91.3
37	132985	7.8	90.6	90.5	71.4	68.7	80.5	60.1	77.0
38	67174	0.4	97.7	96.6	88.1	89.0	90.8	89.2	91.9
39	65183	6.7	91.9	91.7	71.8	71.1	82.3	63.4	78.7
40	325222	8.2	89.3	89.4	68.9	70.3	78.5	58.2	75.8
41	141252	7.5	91.5	91.1	73.4	63.3	79.2	60.5	76.5
42	88648	7.8	91.1	91.0	70.5	64.1	80.6	57.1	75.7
43	235700	8.1	90.4	90.3	70.8	68.6	80.5	59.7	76.7
44	48377	9.5	89.3	89.3	66.7	62.2	79.8	52.5	73.3
45	66371	6.4	92.2	92.1	74.0	74.2	82.8	64.6	80.0
46	50521	9.1	89.8	89.7	70.0	66.4	80.4	56.4	75.5
153	13672	0.2	98.1	96.0	90.5	89.6	92.0	92.1	93.0

REGION -W.N.C. ATTACK 23 INTEGRATED DOSE INTERVAL=0-999

POPULATION ITEM	TOTALS	PROMPT	15 DEC 51	25 DEC 51	15 MAY 51	15 JUN 51	5 JUL 52	25 NOV 50	SIX WIND AVERAGE
1	509674	0.2	98.8	97.1	95.7	93.9	96.1	97.1	96.5
3	153950	10.8	88.7	84.7	77.8	74.0	75.0	81.1	80.2
6	90463	17.8	82.0	77.6	68.4	62.3	62.4	72.4	70.9
7	282916	0.1	98.7	94.8	93.2	92.0	94.1	95.5	94.7
10	175861	10.8	88.8	84.9	77.3	73.9	74.9	81.2	80.2
12	172061	10.4	88.7	84.9	79.6	75.5	76.6	82.1	81.2
24	44979	15.2	84.6	80.0	71.9	64.9	65.6	74.4	73.6
25	25952	13.4	86.2	81.9	74.5	69.3	69.8	77.4	76.5
74	92623	18.4	81.2	77.4	69.2	65.5	62.8	72.2	71.4
94	86723	21.0	78.8	73.1	62.0	57.6	58.5	69.3	66.5
135	440663	0.1	98.9	97.1	95.4	94.0	95.9	97.2	96.4
148	779900	0.2	98.9	94.1	92.9	92.6	93.8	96.1	94.7
149	247491	0.2	98.9	95.8	90.3	94.0	94.6	96.3	95.0
150	64587	0.1	99.1	95.9	95.9	89.5	95.5	93.2	94.8
151	32569	0.1	98.3	96.5	94.4	93.1	95.3	95.5	95.5
152	435310	0.1	99.0	92.7	93.8	92.1	93.0	96.5	94.5
159	263030	0.2	98.2	94.6	91.6	91.5	94.2	93.8	94.0
37	55582	11.9	87.6	83.4	76.6	72.5	73.4	79.8	78.9
38	89565	0.2	98.8	94.8	93.4	92.2	94.2	95.8	94.9
39	31439	10.4	89.1	85.1	78.4	73.7	75.3	81.4	80.5
40	51123	16.1	83.7	77.1	68.3	62.5	63.0	74.5	71.5
41	52455	15.8	83.7	79.2	71.6	63.4	65.4	73.7	72.8
42	41699	15.2	84.2	80.4	70.7	66.8	67.4	74.8	74.1
43	108469	12.4	87.1	83.0	75.9	72.1	73.3	79.0	78.4
44	21644	18.9	80.8	75.6	67.6	62.7	62.3	70.8	70.0
45	32497	9.5	90.1	86.4	81.0	76.6	77.3	83.1	82.4
46	23281	14.5	84.9	81.5	73.6	69.4	68.2	76.1	75.6
153	28376	0.1	98.9	94.7	94.9	92.0	94.1	96.2	95.1

REGION -S.CEN. ATTACK 23 INTEGRATED DOSE INTERVAL=0-999

POPULATION ITEM	TOTALS	PROMPT	15 DEC 51	25 DEC 51	15 MAY 51	15 JUN 51	5 JUL 52	25 NOV 50	SIX WIND AVERAGE
1	429332	0.5	93.9	92.9	89.2	87.6	88.7	92.7	90.8
3	169520	5.5	91.7	84.7	79.1	75.0	70.4	83.1	80.7
6	114777	7.6	90.8	81.9	76.0	70.9	63.6	80.0	77.2
7	151832	0.5	93.8	89.9	85.6	84.0	89.2	91.2	89.0
10	202207	5.8	91.8	84.7	79.4	74.6	69.5	83.0	80.5
12	142979	4.6	91.6	85.0	79.1	76.6	74.5	83.6	81.7
24	44549	7.2	91.1	80.3	75.2	74.1	61.7	81.4	77.3
25	25801	6.5	91.3	82.2	76.5	73.9	65.0	82.0	78.5
74	98472	7.6	90.1	79.7	73.9	75.2	62.8	82.2	77.3
94	71366	7.4	91.2	79.9	76.4	79.1	60.6	78.6	77.6
135	321592	0.4	94.6	93.1	89.5	87.8	88.3	93.7	91.2
148	365893	0.7	95.4	91.0	85.5	85.6	87.6	93.0	89.7
149	205064	0.6	96.5	93.2	85.1	86.5	88.8	95.2	90.9
150	20712	1.1	93.9	83.1	83.6	82.7	83.6	88.7	85.9
151	22774	0.4	93.8	80.2	89.6	91.2	88.2	91.6	89.1
152	117907	0.7	94.0	90.6	85.8	83.5	86.2	90.1	88.4
159	133425	0.4	94.1	91.2	88.0	84.7	91.2	92.7	90.3
37	56573	5.8	91.5	83.3	77.9	75.2	68.9	82.7	79.9
38	53441	0.7	94.1	90.1	86.0	84.5	88.0	91.3	89.0
39	42628	5.5	91.9	84.1	78.1	74.9	69.4	83.5	80.3
40	41752	7.0	89.9	74.6	74.7	75.3	61.5	79.3	75.9
41	49790	5.6	92.3	83.8	79.0	80.0	68.5	82.9	81.1
42	42478	6.1	91.8	83.0	78.4	76.7	67.0	79.9	79.5
43	117375	6.3	91.3	82.9	77.1	74.3	67.9	82.3	79.3
44	21910	8.1	90.2	77.0	71.0	71.7	59.1	79.4	74.7
45	32287	4.9	92.0	86.6	78.8	73.7	71.5	84.3	81.2
46	28182	9.7	88.2	81.5	71.4	58.7	60.2	79.1	73.2
153	14690	0.5	92.9	89.9	86.3	84.4	86.9	90.4	88.5

REGION -MOUNT. ATTACK 23 INTEGRATED DOSE INTERVAL=0-999

POPULATION ITEM	TOTALS	PROMPT	15 DEC 51	25 DEC 51	15 MAY 51	15 JUN 51	5 JUL 52	25 NOV 50	SIX WIND AVERAGE
1	856956	0.2	96.9	96.5	93.6	90.2	93.4	90.4	93.5
3	68547	8.3	80.7	80.9	70.4	57.9	77.3	74.2	73.6
6	46012	12.0	74.9	74.9	63.4	47.0	72.1	67.5	66.6
7	57070	0.4	94.6	95.5	86.0	87.9	93.8	91.2	91.5
10	87708	7.6	81.7	82.0	70.4	58.3	77.5	75.6	74.3
12	52764	10.1	79.3	79.5	71.4	60.4	78.4	73.2	73.7
24	23418	10.7	77.4	77.5	66.3	49.1	72.9	69.6	68.8
25	12139	9.9	78.5	78.7	68.1	53.1	75.1	71.3	70.8
74	35254	15.4	72.1	72.3	64.3	48.5	72.1	65.4	65.8
94	20764	15.0	73.8	73.6	58.7	49.1	75.4	67.5	66.4
135	413186	0.2	97.6	96.3	91.8	91.2	94.2	92.2	93.9
148	235616	0.5	87.5	90.2	79.1	80.5	91.1	83.2	85.3
149	98287	0.6	83.9	88.1	80.1	77.1	88.8	78.3	82.7
150	15279	0.8	88.3	88.4	72.3	78.6	92.0	84.4	84.0
151	4870	1.1	90.1	93.1	71.0	79.6	88.1	86.3	84.7
152	117207	0.4	90.2	92.1	79.6	83.7	93.0	87.0	87.6
159	50553	0.5	79.2	86.2	79.1	72.7	85.6	71.9	79.1
37	23309	9.2	79.6	79.8	69.5	56.6	77.2	73.0	72.6
38	22353	0.8	87.6	89.6	80.6	79.8	91.2	83.8	85.4
39	18373	7.6	79.9	79.9	69.1	55.5	76.6	72.4	72.2
40	16743	10.1	74.4	73.6	61.5	51.3	79.4	68.0	68.0
41	12782	13.8	75.9	76.5	64.9	51.4	77.4	72.5	69.8
42	18568	9.6	81.4	82.0	72.3	58.4	77.9	75.0	74.5
43	46771	10.0	78.5	78.6	68.5	55.3	76.5	71.8	71.5
44	9534	13.8	71.0	71.1	59.9	44.0	71.3	63.7	63.5
45	15536	8.5	81.7	82.0	70.0	60.4	77.4	75.0	74.4
46	16077	10.4	80.6	80.8	66.9	54.6	73.3	74.7	71.8
153	10596	0.3	94.7	95.1	87.6	88.5	94.0	90.3	91.7

REGION -N.WEST ATTACK 23 INTEGRATED DOSE INTERVAL=0-999

POPULATION ITEM	TOTALS	PROMPT	15 DEC 51	25 DEC 51	15 MAY 51	15 JUN 51	5 JUL 52	25 NOV 50	SIX WIND AVERAGE
1	162957	0.5	99.5	94.1	91.2	88.8	84.7	99.5	93.0
3	46222	12.9	87.1	80.9	61.9	78.9	79.1	87.1	79.1
6	30440	18.4	81.6	74.5	51.7	72.8	73.6	81.6	72.6
7	30091	1.0	98.9	93.3	78.2	86.3	88.9	98.9	90.8
10	50088	11.5	88.4	81.9	61.7	79.7	80.2	88.4	80.1
12	46262	15.4	84.6	78.0	61.0	76.7	76.3	84.6	76.9
24	16408	16.2	83.8	78.1	52.3	76.1	76.7	83.8	75.1
25	9248	15.0	85.1	79.1	57.8	77.1	77.4	85.1	76.9
74	24168	22.0	78.0	71.4	52.0	69.1	69.6	78.0	69.7
94	32311	18.5	81.5	76.2	54.8	75.5	74.7	81.5	74.0
135	62429	0.6	99.4	90.0	89.5	82.2	84.1	99.4	90.8
148	98111	0.9	99.1	94.5	77.9	80.3	89.7	99.1	90.1
149	57546	0.8	99.2	94.2	77.2	75.7	87.5	99.2	88.8
150	11300	1.4	98.6	95.3	80.2	87.3	94.7	98.6	92.4
151	5946	1.5	98.4	95.9	65.7	88.4	94.9	98.4	90.3
152	23327	0.6	99.4	94.5	81.4	86.0	91.3	99.4	92.0
159	36570	0.8	99.2	94.7	80.2	79.4	92.5	99.2	90.9
37	16370	14.3	85.7	79.8	59.9	77.8	78.0	85.7	77.8
38	10772	1.0	99.0	93.4	72.3	83.0	88.1	99.0	89.1
39	10784	11.6	88.4	82.4	63.3	79.1	79.8	88.4	80.2
40	27160	12.7	87.3	83.5	60.2	83.3	82.2	87.3	80.6
41	12484	14.3	85.7	81.4	63.5	80.3	80.0	85.7	79.4
42	12767	17.4	82.6	75.6	54.7	73.9	74.0	82.6	73.9
43	32594	15.8	84.2	77.4	56.9	75.4	75.6	84.2	75.6
44	6889	20.9	79.1	72.4	48.1	71.0	71.3	79.1	70.2
45	10321	12.5	87.6	81.8	64.1	77.4	80.3	87.6	79.8
46	8344	14.9	85.1	78.6	62.3	76.6	77.1	85.1	77.5
153	2504	0.7	99.3	93.4	86.4	88.7	89.5	99.3	92.8

POPULATION ITEM	U. S. TOTALS TOTALS	PROMPT	ATTACK 23 15 DEC 51	25 DEC 51	15 MAY 51	INTEGRATED DOSE INTERVAL=0-2999 15 JUN 51	5 JUL 52	25 NOV 50	SIX WIND AVERAGE
1	2971499	0.4	99.1	99.0	97.9	97.1	97.0	96.6	97.8
3	1784656	9.3	89.5	90.2	85.9	78.4	79.1	82.9	84.3
6	1246526	12.6	85.9	86.7	82.2	71.1	72.9	77.7	79.4
7	1343059	0.4	99.2	99.3	96.4	97.4	97.3	98.2	97.9
10	2019872	9.0	89.7	90.3	85.8	79.5	79.4	82.9	84.6
12	1653024	9.4	89.6	90.1	86.6	78.6	80.1	83.5	84.7
24	675084	11.1	87.3	88.2	83.5	71.7	73.3	77.8	80.3
25	329959	10.5	88.1	88.9	84.5	74.4	76.0	80.1	82.0
74	1103668	14.6	84.8	82.0	81.0	41.9	59.3	77.7	71.1
94	1387922	11.4	87.8	88.3	84.7	73.7	77.9	79.6	82.0
135	1750307	0.3	99.4	99.4	98.2	97.4	97.9	98.2	98.4
148	3039695	0.7	97.8	98.1	95.2	94.4	95.6	95.9	96.2
149	1331375	0.8	97.3	97.7	94.1	93.6	94.8	95.9	95.6
150	401179	0.8	97.4	98.0	95.6	93.9	94.6	94.2	95.6
151	225141	0.8	97.1	97.5	94.7	92.8	93.4	92.5	94.6
152	1076563	0.4	98.6	98.8	96.5	95.8	97.4	97.2	97.4
159	1961169	0.6	98.6	98.7	94.9	96.2	95.4	96.7	96.8
37	642352	9.8	89.0	89.6	85.5	77.0	78.3	82.0	83.6
38	424202	0.7	98.2	98.5	95.3	94.9	95.4	96.2	96.4
39	379219	8.7	89.8	90.5	85.9	79.1	78.9	82.8	84.5
40	982094	9.6	89.1	89.8	86.4	78.1	78.7	80.3	83.8
41	765932	9.3	90.0	90.3	86.8	76.6	79.2	83.3	84.4
42	443688	10.8	88.3	88.8	84.7	75.3	76.6	81.6	82.6
43	1174589	10.3	88.5	89.1	85.0	76.1	77.3	81.7	83.0
44	268623	12.9	86.0	86.6	82.2	68.7	72.0	78.1	78.9
45	337926	8.9	89.9	90.5	86.3	79.0	80.0	82.9	84.8
46	317218	14.2	84.5	85.3	78.1	70.2	71.0	75.7	77.5
153	92303	0.4	99.0	99.2	97.4	96.9	97.5	97.9	98.0

POPULATION ITEM	REGION -N.EAST TOTALS	PROMPT	ATTACK 23 15 DEC 51	25 DEC 51	15 MAY 51	INTEGRATED DOSE INTERVAL=0-2999 15 JUN 51	5 JUL 52	25 NOV 50	SIX WIND AVERAGE
1	163593	0.9	99.1	98.9	97.6	96.4	96.2	93.6	96.9
3	446779	10.3	89.7	89.6	87.4	66.0	71.4	84.0	81.4
6	357939	12.4	87.6	87.6	85.9	59.0	67.0	82.9	78.3
7	91118	0.9	99.1	99.1	97.1	96.4	96.8	91.1	96.6
10	465707	9.8	90.2	90.1	87.6	68.4	71.6	84.2	82.0
12	449988	10.8	89.2	89.0	86.9	65.5	72.3	83.5	81.1
24	204904	9.6	90.4	90.4	88.4	63.3	67.3	85.5	80.9
25	93456	10.1	89.9	89.8	87.7	63.7	70.0	84.6	80.9
74	384765	15.5	84.5	84.5	83.7	31.4	62.1	81.2	71.2
94	452781	10.8	89.2	89.2	87.5	62.9	74.2	83.4	81.1
135	56329	0.7	99.2	99.2	97.8	97.4	97.4	92.9	97.3
148	229209	1.2	98.8	98.7	94.9	94.6	95.1	91.4	95.6
149	66431	1.8	98.2	98.1	92.6	92.8	92.8	90.6	94.2
150	96556	0.8	99.2	99.2	97.5	97.0	96.5	93.4	97.1
151	40137	1.2	98.8	98.6	91.4	90.6	94.6	89.0	93.8
152	26105	0.8	99.2	99.0	96.7	96.1	96.8	89.7	96.2
159	164942	1.2	98.8	98.6	93.5	95.0	95.8	89.0	95.1
37	170972	10.6	89.4	89.4	87.3	64.1	71.0	83.7	80.8
38	34351	1.6	98.4	98.3	95.4	94.0	93.7	91.3	95.2
39	87191	9.2	90.8	90.6	87.8	69.2	71.5	84.7	82.4
40	305811	8.9	91.1	91.1	89.3	73.5	74.9	84.9	84.1
41	265616	10.5	89.5	89.4	87.1	62.2	70.9	82.4	80.2
42	118945	11.2	88.8	88.7	87.0	60.3	68.9	83.9	79.6
43	297900	11.1	88.9	88.8	86.8	61.6	69.2	83.7	79.9
44	86053	12.5	87.5	87.4	85.8	53.9	65.7	83.3	77.3
45	82973	9.7	90.2	90.2	88.0	68.5	72.3	84.5	82.3
46	77800	12.5	87.6	87.4	84.8	59.5	66.9	81.1	77.9
153	5010	0.7	99.3	99.3	98.2	97.7	97.7	93.0	97.5

REGION -S.EAST ATTACK 23 INTEGRATED DOSE INTERVAL=0-2999

POPULATION ITEM	TOTALS	PROMPT	15 DEC 51	25 DEC 51	15 MAY 51	15 JUN 51	5 JUL 52	25 NOV 50	SIX WIND AVERAGE
1	447603	0.6	99.4	99.3	95.5	97.6	95.2	98.5	97.6
3	380213	8.2	91.8	91.6	82.7	87.4	80.8	85.2	86.6
6	206811	13.8	86.2	86.2	74.2	80.4	70.4	76.1	78.9
7	440215	0.4	99.6	99.4	94.0	97.6	95.7	98.6	97.5
10	439169	8.4	91.6	91.4	82.0	87.0	80.0	84.9	86.2
12	315169	7.4	92.6	92.4	85.1	89.1	83.3	86.7	88.2
24	93789	13.7	86.3	86.1	73.2	79.7	71.5	72.1	78.2
25	55109	10.9	89.1	88.8	78.4	83.6	75.7	79.4	82.5
74	152237	16.4	83.6	83.4	74.1	78.9	69.4	74.3	77.3
94	195435	10.3	89.7	89.5	82.4	87.5	81.8	77.7	84.8
135	236925	0.4	99.6	99.5	95.4	97.9	95.9	98.7	97.8
148	528412	0.6	99.4	99.1	94.2	96.7	92.1	97.2	96.5
149	293615	0.7	99.3	99.1	93.2	97.0	91.2	97.8	96.3
150	53851	0.9	99.1	98.9	92.8	93.1	90.4	95.6	95.0
151	71310	0.4	99.6	98.7	97.7	96.7	91.6	94.2	96.4
152	103448	0.4	99.6	99.5	95.2	97.5	95.6	98.1	97.6
159	778310	0.6	99.4	99.2	93.6	96.7	92.2	97.6	96.5
37	128971	9.2	90.8	90.6	81.6	86.4	79.6	83.5	85.4
38	120665	0.7	99.3	99.2	93.7	97.1	93.6	98.0	96.8
39	87450	8.4	91.6	91.4	82.9	87.1	79.4	85.0	86.2
40	122760	7.2	92.8	92.7	83.1	89.1	84.1	81.9	87.3
41	183746	6.1	93.9	93.6	88.3	91.6	86.9	87.4	90.3
42	81201	11.2	88.8	88.6	78.4	83.8	73.4	80.4	82.2
43	227604	9.8	90.2	90.0	80.8	85.8	77.2	82.9	84.5
44	45079	13.5	86.5	86.4	75.4	81.6	70.8	77.0	79.6
45	66285	8.9	91.1	90.9	82.2	86.5	80.6	84.1	85.9
46	77608	19.5	80.5	80.2	61.6	68.0	62.4	69.0	70.3
153	13755	0.4	99.6	99.5	95.7	97.6	95.6	98.5	97.7

REGION -E.N.C. ATTACK 23 INTEGRATED DOSE INTERVAL=0-2999

POPULATION ITEM	TOTALS	PROMPT	15 DEC 51	25 DEC 51	15 MAY 51	15 JUN 51	5 JUL 52	25 NOV 50	SIX WIND AVERAGE
1	244811	0.4	99.6	99.6	98.6	99.4	99.4	99.0	99.3
3	362252	7.4	92.6	92.6	90.1	92.5	92.5	89.5	91.6
6	264368	9.9	90.1	90.1	87.5	90.0	90.0	86.4	89.0
7	256227	0.2	99.8	99.8	98.5	99.6	99.6	99.1	99.4
10	424715	7.3	92.7	92.7	90.2	92.7	92.7	89.2	91.7
12	336007	7.6	92.4	92.4	90.1	92.4	92.4	90.5	91.7
24	157831	8.4	91.6	91.6	89.1	91.6	91.6	87.4	90.5
25	71985	8.0	91.9	91.9	89.5	91.9	91.9	88.5	90.9
74	215192	11.9	88.1	88.1	85.9	88.1	88.1	87.6	87.6
94	407382	9.3	90.7	90.7	87.7	90.7	90.7	87.5	89.7
135	161541	0.2	99.8	99.8	98.6	99.6	99.6	99.2	99.4
148	520343	0.3	99.7	99.7	98.5	99.5	99.5	99.1	99.3
149	191030	0.5	99.5	99.5	98.5	99.3	99.3	98.9	99.2
150	106538	0.2	99.8	99.8	99.2	99.7	99.7	99.3	99.6
151	26556	0.2	99.8	99.8	98.7	99.6	99.6	99.3	99.5
152	196279	0.3	99.7	99.7	98.1	99.6	99.6	99.1	99.3
159	423744	0.3	99.7	99.7	97.9	99.6	99.6	98.9	99.3
37	132985	7.8	92.2	92.2	89.8	92.2	92.2	89.3	91.3
38	67174	0.4	99.6	99.6	98.3	99.4	99.4	98.6	99.1
39	65183	6.7	93.3	93.3	90.5	93.3	93.3	90.8	92.4
40	325222	8.2	91.8	91.8	89.7	91.8	91.8	87.9	90.8
41	141252	7.5	92.5	92.5	89.5	92.4	92.4	90.6	91.6
42	88648	7.8	92.2	92.2	89.8	92.2	92.2	89.4	91.3
43	235700	8.1	91.9	91.9	89.4	91.8	91.8	89.2	91.0
44	48377	9.5	90.5	90.5	87.9	90.5	90.5	87.8	89.6
45	66371	6.4	93.6	93.6	91.5	93.6	93.6	88.8	92.4
46	50521	9.1	90.9	90.9	87.9	90.9	90.9	87.6	89.8
153	13672	0.2	99.8	99.8	98.7	99.7	99.7	99.2	99.5

REGION -W.N.C. ATTACK 23 INTEGRATED DOSE INTERVAL=0-2999

POPULATION ITEM	TOTALS	PROMPT	15 DEC 51	25 DEC 51	15 MAY 51	15 JUN 51	5 JUL 52	25 NOV 50	SIX WIND AVERAGE
1	509674	0.2	99.8	99.8	99.4	98.7	99.5	99.8	99.5
3	153950	10.8	89.2	89.2	88.5	88.6	88.1	89.2	88.8
6	90463	17.8	82.2	82.2	81.9	81.8	81.2	82.2	81.9
7	282916	0.1	99.9	99.9	98.4	98.7	99.2	99.9	99.3
10	175861	10.8	89.2	89.2	88.5	88.7	88.1	89.2	88.8
12	172061	10.4	89.6	89.6	88.9	88.8	88.7	89.6	89.2
24	44979	15.2	84.8	84.8	84.4	84.4	83.8	84.8	84.5
25	25952	13.4	86.6	86.6	86.2	86.1	85.5	86.6	86.3
74	92623	18.4	81.6	81.6	81.2	81.1	80.3	81.6	81.3
94	86723	21.0	79.0	79.0	78.8	78.9	77.6	79.0	78.7
135	440663	0.1	99.9	99.9	99.4	98.9	99.5	99.9	99.6
148	779900	0.2	99.9	99.9	98.3	98.6	99.1	99.9	99.3
149	247491	0.2	99.8	99.8	97.0	98.7	99.3	99.8	99.1
150	64587	0.1	99.9	99.9	99.4	99.1	99.3	99.9	99.6
151	32569	0.1	99.9	99.9	99.3	99.3	99.5	99.9	99.6
152	435310	0.1	99.9	99.9	98.8	98.3	98.9	99.9	99.3
159	263030	0.2	99.8	99.8	98.4	98.7	99.1	99.8	99.3
37	55582	11.9	88.1	88.1	87.6	87.5	87.1	88.1	87.7
38	89565	0.2	99.8	99.8	98.4	98.7	99.2	99.8	99.3
39	31439	10.4	89.6	89.6	89.2	89.1	88.4	89.6	89.3
40	51123	16.1	83.9	83.9	83.7	83.5	82.1	83.9	83.5
41	52455	15.8	84.2	84.2	83.9	83.9	83.3	84.2	83.9
42	41699	15.2	84.7	84.7	84.4	84.3	83.8	84.7	84.5
43	108469	12.4	87.6	87.6	87.1	87.0	86.6	87.6	87.2
44	21644	18.9	81.1	81.1	80.9	80.7	79.9	81.1	80.8
45	32497	9.5	90.5	90.5	90.0	89.8	89.6	90.5	90.1
46	23281	14.5	85.5	85.5	85.1	85.0	84.4	85.5	85.1
153	28376	0.1	99.9	99.9	99.2	98.6	99.2	99.9	99.4

REGION -S.CEN. ATTACK 23 INTEGRATED DOSE INTERVAL=0-2999

POPULATION ITEM	TOTALS	PROMPT	15 DEC 51	25 DEC 51	15 MAY 51	15 JUN 51	5 JUL 52	25 NOV 50	SIX WIND AVERAGE
1	429332	0.5	99.5	99.5	99.2	97.4	96.9	99.5	98.7
3	169520	5.5	94.5	94.5	93.7	90.3	88.2	94.5	92.6
6	114777	7.6	92.4	92.4	91.9	87.2	84.6	92.4	90.1
7	151832	0.5	99.5	99.5	99.2	96.5	96.7	99.5	98.5
10	202207	5.8	94.2	94.2	93.4	89.9	87.9	94.2	92.3
12	142979	4.6	95.4	95.4	94.7	91.7	89.4	95.4	93.7
24	44549	7.2	92.8	92.8	92.4	88.0	85.0	92.8	90.6
25	25801	6.5	93.5	93.5	92.9	88.8	86.2	93.5	91.4
74	98472	7.6	92.4	92.4	91.9	88.4	85.6	92.4	90.5
94	71366	7.4	92.6	92.6	91.7	87.0	85.4	92.6	90.3
135	321592	0.4	99.6	99.6	99.4	97.3	96.6	99.6	98.7
148	365893	0.7	99.3	99.3	99.2	95.2	96.1	99.3	98.1
149	205064	0.6	99.4	99.4	99.3	95.7	96.9	99.4	98.4
150	20712	1.1	98.9	98.9	98.6	93.5	93.7	98.9	97.1
151	22774	0.4	99.6	99.6	99.0	97.4	97.7	99.6	98.8
152	117907	0.7	99.3	99.3	99.1	94.1	94.9	99.3	97.6
159	133425	0.4	99.6	99.6	99.0	98.0	97.6	99.6	98.9
37	56573	5.8	94.2	94.2	93.5	89.7	87.4	94.2	92.2
38	53441	0.7	99.3	99.3	99.1	96.1	96.4	99.3	98.3
39	42628	5.5	94.5	94.5	93.9	90.0	88.1	94.5	92.6
40	41752	7.0	93.0	93.0	92.3	85.3	83.5	93.0	90.0
41	49790	5.6	94.4	94.4	93.5	90.8	89.2	94.4	92.8
42	42478	6.1	93.9	93.9	93.5	89.7	86.9	93.9	92.0
43	117375	6.3	93.7	93.7	93.1	89.1	86.7	93.7	91.7
44	21910	8.1	91.9	91.9	91.5	87.0	83.9	91.9	89.7
45	32287	4.9	95.1	95.1	94.4	90.0	89.2	95.1	93.1
46	28182	9.7	90.3	90.3	89.9	85.3	79.2	90.3	87.5
153	14690	0.5	99.4	99.4	99.2	96.9	95.7	99.4	98.4

REGION -MOUNT. ATTACK 23 INTEGRATED DOSE INTERVAL=0-2999

POPULATION ITEM	TOTALS	PROMPT	15 DEC 51	25 DEC 51	15 MAY 51	15 JUN 51	5 JUL 52	25 NOV 50	SIX WIND AVERAGE
1	856956	0.2	99.8	99.8	98.6	97.2	98.8	95.1	98.2
3	68547	8.3	91.7	91.7	82.1	74.5	87.1	77.5	84.1
6	46012	12.0	88.0	88.0	75.7	65.3	82.7	69.6	78.2
7	57070	0.4	99.6	99.6	96.3	95.9	98.4	95.6	97.6
10	87708	7.6	92.4	92.4	83.1	75.3	87.8	78.9	85.0
12	52764	10.1	89.9	89.9	80.9	74.9	85.9	76.4	83.0
24	23418	10.7	89.3	89.3	78.3	67.8	84.7	72.3	80.3
25	12139	9.9	90.1	90.1	79.7	71.0	85.5	74.4	81.8
74	35254	15.4	84.6	84.6	73.2	66.3	81.1	67.3	76.2
94	20764	15.0	85.0	85.0	74.2	67.4	80.6	72.4	77.4
135	413186	0.2	99.8	99.8	98.6	96.5	99.2	96.2	98.4
148	235616	0.5	99.5	99.5	91.1	90.2	98.3	88.0	94.4
149	98287	0.6	99.4	99.4	89.5	88.2	97.4	84.5	93.1
150	15279	0.8	99.2	99.2	88.7	88.9	98.5	88.5	93.8
151	4870	1.1	98.9	98.9	92.6	88.9	96.2	89.4	94.2
152	117207	0.4	99.6	99.6	92.8	92.1	99.2	90.7	95.7
159	50553	0.5	99.5	99.5	87.4	86.2	97.6	78.7	91.5
37	23309	9.2	90.8	90.8	80.9	73.3	86.6	76.0	83.1
38	22353	0.8	99.2	99.2	90.5	89.4	97.7	87.8	94.0
39	18373	7.6	92.4	92.4	80.8	72.0	87.3	75.3	83.4
40	16743	10.1	89.9	89.9	75.4	65.8	85.4	71.3	79.6
41	12782	13.8	86.2	86.2	76.9	70.3	83.7	74.0	79.6
42	18568	9.6	90.4	90.4	82.8	75.7	87.0	77.6	84.0
43	46771	10.0	89.9	89.9	79.7	71.9	85.8	74.6	82.0
44	9534	13.8	86.2	86.2	71.8	61.8	81.4	65.8	75.5
45	15536	8.5	91.5	91.5	82.9	74.8	86.0	77.7	84.1
46	16077	10.4	89.6	89.6	82.0	74.0	84.6	77.4	82.9
153	10596	0.3	99.7	99.7	96.4	95.5	99.2	94.5	97.5

REGION -N.WEST ATTACK 23 INTEGRATED DOSE INTERVAL=0-2999

POPULATION ITEM	TOTALS	PROMPT	15 DEC 51	25 DEC 51	15 MAY 51	15 JUN 51	5 JUL 52	25 NOV 50	SIX WIND AVERAGE
1	162957	0.5	99.5	99.5	99.5	99.5	99.5	99.5	99.5
3	46222	12.9	87.1	87.1	87.1	87.1	87.1	87.1	87.1
6	30440	18.4	81.6	81.6	81.6	81.6	81.6	81.6	81.6
7	30091	1.0	98.9	98.9	98.9	98.9	98.9	98.9	98.9
10	50088	11.5	88.4	88.4	88.4	88.4	88.4	88.4	88.4
12	46262	15.4	84.6	84.6	84.6	84.6	84.6	84.6	84.6
24	18408	16.2	83.8	83.8	83.8	83.8	83.8	83.8	83.8
25	9248	15.0	85.1	85.1	85.1	85.1	85.1	85.1	85.0
74	24168	22.0	78.0	78.0	78.0	78.0	78.0	78.0	78.0
94	32311	18.5	81.5	81.5	81.5	81.5	81.5	81.5	81.5
135	62429	0.6	99.4	99.4	99.4	99.4	99.4	99.4	99.4
148	98111	0.9	99.1	99.1	99.1	99.1	99.1	99.1	99.1
149	57546	0.8	99.2	99.2	99.2	99.2	99.2	99.2	99.2
150	11300	1.4	98.6	98.6	98.6	98.6	98.6	98.6	98.6
151	5946	1.5	98.4	98.4	98.4	98.4	98.4	98.4	98.4
152	23327	0.6	99.4	99.4	99.4	99.4	99.4	99.4	99.4
159	36570	0.8	99.2	99.2	99.2	99.2	99.2	99.2	99.2
37	16370	14.3	85.7	85.7	85.7	85.7	85.7	85.7	85.7
38	10772	1.0	99.0	99.0	99.0	99.0	99.0	99.0	99.0
39	10784	11.6	88.4	88.4	88.4	88.4	88.4	88.4	88.4
40	27160	12.7	87.3	87.3	87.3	87.3	87.3	87.3	87.3
41	12484	14.3	85.7	85.7	85.7	85.7	85.7	85.7	85.7
42	12767	17.4	82.6	82.6	82.6	82.6	82.6	82.6	82.6
43	32594	15.8	84.2	84.2	84.2	84.2	84.2	84.2	84.2
44	6889	20.9	79.1	79.1	79.1	79.1	79.1	79.1	79.1
45	10321	12.5	87.6	87.6	87.6	87.6	87.6	87.6	87.5
46	8344	14.9	85.1	85.1	85.1	85.1	85.1	85.1	85.1
153	2504	0.7	99.3	99.3	99.3	99.3	99.3	99.3	99.3

POPULATION ITEM	TOTALS	PROMPT	15 DEC 51	25 DEC 51	15 MAY 51	15 JUN 51	5 JUL 52	25 NOV 50	SIX WIND AVERAGE
	U. S. TOTALS			ATTACK 43		INTEGRATED DOSE INTERVAL=0-999			
1	2971499	0.5	89.4	89.4	87.1	87.3	86.8	86.1	87.7
3	1784656	12.5	75.6	80.2	67.8	61.7	61.8	67.7	69.1
6	1246526	17.4	70.4	76.1	61.1	52.4	53.0	61.3	62.4
7	1343059	0.4	87.9	89.1	84.6	86.2	87.5	83.9	86.5
10	2019872	11.8	76.1	80.7	68.5	62.7	62.6	68.1	69.8
12	1653024	13.1	75.4	79.3	67.9	62.6	62.4	67.8	69.2
24	675084	15.0	71.5	78.8	62.6	52.1	54.6	60.4	63.3
25	329959	14.6	72.9	78.6	64.6	56.4	57.4	63.7	65.6
74	1103668	30.1	60.7	65.0	51.1	45.9	46.1	52.4	53.5
94	1387922	18.5	71.4	76.3	62.8	55.7	57.4	58.6	63.7
135	1750307	0.5	88.3	88.3	84.4	85.6	86.5	85.1	86.4
148	3039695	0.5	86.7	86.8	82.9	84.7	84.7	82.6	84.7
149	1331375	0.6	86.5	85.0	83.1	83.4	85.0	81.2	84.0
150	401179	0.5	86.3	91.2	84.9	85.1	82.1	81.3	85.1
151	225141	0.6	83.1	89.3	84.7	83.6	81.0	79.2	83.5
152	1076563	0.4	87.9	86.6	81.5	86.2	86.1	85.2	85.6
159	1961169	0.4	89.8	87.3	84.9	86.5	86.6	83.4	86.4
37	642352	13.6	74.7	79.4	66.5	60.1	60.4	66.2	67.9
38	424202	0.7	86.5	88.1	83.4	84.2	84.5	82.2	84.8
39	379219	10.9	76.4	81.3	68.9	63.0	62.1	69.4	70.2
40	982094	14.0	74.4	79.5	65.9	58.3	59.6	61.5	66.5
41	765932	13.1	76.0	81.7	67.2	60.0	61.3	67.3	68.9
42	443688	15.1	73.5	78.1	63.9	56.8	57.0	65.1	65.7
43	1174589	14.1	74.1	78.8	65.7	59.2	59.1	66.3	67.2
44	268623	17.5	70.7	76.4	59.1	50.4	51.3	62.8	61.8
45	337926	11.6	76.3	80.4	69.1	63.6	64.2	68.7	70.4
46	317218	17.8	70.9	75.2	59.6	54.5	54.2	61.2	62.6
153	92303	0.4	87.4	88.1	83.7	85.7	85.2	84.2	85.7

POPULATION ITEM	TOTALS	PROMPT	15 DEC 51	25 DEC 51	15 MAY 51	15 JUN 51	5 JUL 52	25 NOV 50	SIX WIND AVERAGE
	REGION -N.EAST			ATTACK 43		INTEGRATED DOSE INTERVAL=0-999			
1	163593	0.70	95.16	95.07	88.97	89.77	86.74	72.90	88.10
3	446779	14.06	75.76	80.67	57.90	42.47	47.66	67.57	62.00
6	357939	17.18	72.48	78.12	52.47	34.01	41.14	67.14	57.56
7	91118	0.58	95.07	94.62	85.98	88.35	83.79	64.34	85.36
10	465707	12.64	76.09	81.93	59.98	44.33	49.26	68.49	63.35
12	449988	15.75	75.86	79.06	57.03	43.14	47.65	65.88	61.44
24	204904	12.44	75.24	83.36	58.87	36.56	44.50	70.99	61.59
25	93456	14.79	74.54	80.55	57.35	39.21	45.43	68.03	60.85
74	384765	46.40	49.21	51.53	27.51	20.84	24.31	44.76	36.36
94	452781	20.32	72.27	75.26	54.78	44.00	49.93	61.07	59.55
135	56329	0.45	96.58	95.26	87.35	89.57	84.28	69.95	87.16
148	229209	0.83	91.12	94.27	84.39	87.26	82.72	66.91	84.44
149	66431	1.29	85.01	93.73	80.96	83.35	80.31	65.29	81.44
150	96556	0.47	97.05	95.81	88.41	90.44	84.21	70.60	87.75
151	40137	1.03	84.34	91.03	80.18	87.12	83.58	66.21	82.08
152	26105	0.70	95.18	94.92	84.75	85.72	82.07	58.43	83.51
159	164942	0.74	87.55	92.91	82.20	88.36	81.32	66.35	83.11
37	170972	15.07	75.50	80.13	56.92	41.18	46.62	66.93	61.21
38	34351	1.57	91.07	93.69	83.27	84.36	80.54	66.29	83.20
39	87191	11.41	76.25	83.29	61.69	44.90	49.06	69.62	64.13
40	305811	11.79	79.51	81.99	62.27	49.11	54.41	68.35	65.94
41	265616	14.80	75.97	81.52	56.48	41.27	47.41	64.03	61.11
42	118945	15.80	73.85	79.04	52.20	36.12	42.76	67.88	58.64
43	297900	15.89	74.53	79.21	55.12	38.18	43.91	67.17	59.69
44	86053	17.60	73.19	78.88	48.89	29.14	37.21	69.48	56.13
45	82973	13.61	76.34	81.21	62.50	45.22	50.12	67.30	63.78
46	77800	16.10	73.26	80.03	53.75	38.88	43.17	67.45	59.42
153	5010	0.40	97.60	95.49	87.17	89.64	84.13	68.32	87.06

REGION -S.EAST ATTACK 43 INTEGRATED DOSE INTERVAL=0-999

POPULATION ITEM	TOTALS	PROMPT	15 DEC 51	25 DEC 51	15 MAY 51	15 JUN 51	5 JUL 52	25 NOV 50	SIX WIND AVERAGE
1	447603	0.31	92.73	94.07	89.82	90.79	90.49	90.00	91.32
3	380213	8.65	83.26	84.84	76.11	79.53	71.78	78.44	78.99
6	206811	15.07	77.24	78.29	67.46	72.15	59.08	70.67	70.81
7	440215	0.22	90.35	92.43	88.26	88.55	91.14	86.34	89.51
10	439169	8.23	83.62	85.31	75.84	79.15	71.70	78.14	78.96
12	315169	8.67	83.46	84.54	78.28	81.18	72.27	79.69	79.90
24	93769	15.91	76.72	77.39	61.26	65.49	57.17	64.37	67.07
25	55109	12.36	79.81	80.83	69.80	73.71	64.20	72.82	73.53
74	152237	17.46	74.77	76.31	66.78	73.95	61.03	69.93	70.46
94	195435	10.17	79.26	85.37	76.20	81.34	73.91	77.50	78.93
135	236925	0.17	91.90	92.39	90.07	89.12	90.27	88.21	90.33
148	528412	0.25	91.79	89.54	88.56	85.48	86.58	85.01	87.83
149	293619	0.26	91.70	88.09	87.40	85.91	88.99	83.44	87.59
150	53651	0.36	90.41	90.13	84.20	81.86	76.62	85.86	84.85
151	71310	0.19	95.47	94.29	94.57	82.14	81.90	85.29	88.94
152	103448	0.20	89.74	89.46	89.27	87.59	87.33	87.95	88.56
159	778310	0.22	92.81	90.93	86.71	89.56	89.61	87.38	89.50
37	126971	10.02	81.82	83.63	74.63	78.42	70.21	76.88	77.60
38	120665	0.39	91.18	91.52	87.26	87.47	88.27	85.47	88.53
39	87450	8.35	83.63	64.64	75.87	79.85	69.42	78.84	78.71
40	122760	9.51	79.96	85.50	75.23	77.26	71.69	76.62	77.71
41	183746	5.81	85.24	89.59	82.50	86.99	80.82	83.90	84.84
42	81201	12.25	79.66	80.53	70.89	75.29	62.66	74.18	73.87
43	227604	10.31	81.63	82.80	73.94	78.25	67.43	76.90	76.82
44	45079	14.41	78.33	78.78	67.27	73.05	58.95	71.95	71.39
45	66285	9.12	82.88	83.85	74.43	79.23	72.38	77.82	78.43
46	77608	23.19	71.05	71.51	52.59	55.78	50.77	56.79	59.75
153	13755	0.16	91.04	91.31	90.58	88.11	87.58	87.90	89.42

REGION -E.N.C. ATTACK 43 INTEGRATED DOSE INTERVAL=0-999

POPULATION ITEM	TOTALS	PROMPT	15 DEC 51	25 DEC 51	15 MAY 51	15 JUN 51	5 JUL 52	25 NOV 50	SIX WIND AVERAGE
1	244811	0.43	93.95	89.78	89.01	88.69	88.37	90.45	90.04
3	362252	15.55	81.62	79.17	70.43	70.28	70.41	56.93	71.47
6	264368	21.00	76.79	75.06	65.23	65.44	65.66	46.44	65.77
7	256227	0.17	94.42	88.98	87.98	88.23	87.14	90.48	89.54
10	424715	15.12	82.35	79.77	70.47	70.36	70.67	56.68	71.72
12	336007	15.49	81.03	78.47	71.31	71.30	71.16	60.52	72.30
24	157831	17.62	80.26	78.37	67.82	68.62	69.02	45.63	68.29
25	71965	17.00	80.61	78.37	68.81	69.14	69.39	51.84	69.69
74	215192	28.45	69.36	67.50	61.05	61.39	61.67	39.49	60.08
94	407362	19.30	78.93	77.30	67.05	66.38	66.38	48.80	67.47
135	161541	0.16	93.71	87.00	89.01	87.94	87.83	90.34	89.30
148	520343	0.30	94.89	85.82	88.81	87.49	87.53	90.46	89.17
149	191030	0.54	96.06	81.50	88.46	87.35	87.48	88.18	88.17
150	106538	0.15	91.77	93.29	87.61	90.15	88.40	93.67	90.81
151	26556	0.16	91.91	90.29	85.83	87.89	85.03	92.19	88.86
152	196279	0.17	95.85	85.37	90.22	86.13	87.43	90.71	89.28
159	423744	0.22	95.95	84.80	89.00	86.08	87.07	88.50	88.57
37	132985	16.56	60.68	78.24	69.49	69.64	69.74	55.27	70.51
38	67174	0.54	93.68	88.31	87.40	87.40	86.58	88.97	88.72
39	65183	14.29	82.96	80.47	70.52	71.31	71.82	57.80	72.48
40	325222	16.51	81.46	79.00	68.40	68.11	68.25	53.63	69.81
41	141252	17.11	79.99	78.82	69.78	67.65	67.50	54.79	69.75
42	88646	18.05	79.44	77.16	69.24	67.73	68.13	51.14	68.81
43	235700	17.03	80.16	77.90	69.04	69.63	69.82	54.98	70.25
44	48377	21.08	76.74	74.67	64.67	66.92	67.10	45.71	65.97
45	66371	13.30	83.41	79.55	72.21	73.45	73.31	59.56	73.58
46	50521	20.06	77.68	74.08	65.30	68.09	68.58	52.19	67.65
153	13672	0.15	93.46	89.49	83.89	88.21	87.85	91.87	89.96

REGION -W.N.C. ATTACK 43 INTEGRATED DOSE INTERVAL=0-999

POPULATION ITEM	TOTALS	PROMPT	15 DEC 51	25 DEC 51	15 MAY 51	15 JUN 51	5 JUL 52	25 NOV 50	SIX WIND AVERAGE
1	509674	0.78	78.52	75.54	72.39	77.59	78.42	77.45	76.65
3	153950	11.40	65.58	73.59	64.65	73.10	73.34	73.78	70.67
6	90463	16.61	58.95	68.55	57.82	67.29	66.66	69.17	64.74
7	282916	0.50	77.74	80.71	74.63	82.58	85.72	81.52	80.48
10	175861	11.35	64.75	73.88	64.64	73.47	73.39	74.21	70.72
12	172061	11.26	67.19	73.39	64.79	73.16	74.41	74.15	71.18
24	44979	15.03	61.94	72.25	61.87	72.17	71.19	71.60	68.50
25	25952	13.74	63.31	72.32	62.48	71.76	71.35	72.22	68.91
74	92623	21.06	59.20	64.70	55.44	63.18	64.44	65.04	62.00
94	86723	26.50	52.66	61.05	51.77	58.54	57.94	64.07	57.67
135	440663	0.79	78.13	77.03	71.63	78.34	79.21	76.41	76.79
148	779900	0.52	81.30	81.09	74.27	85.33	87.85	82.26	82.02
149	247491	0.80	80.08	76.76	72.44	81.44	85.40	78.24	79.06
150	64587	0.36	72.27	87.51	82.34	80.39	87.53	81.87	81.98
151	32569	0.24	76.23	86.81	79.13	86.58	90.33	83.30	83.73
152	435310	0.41	83.71	82.16	73.75	88.18	89.10	84.53	83.57
159	263030	0.57	80.38	77.78	73.82	82.69	86.07	80.00	80.12
37	55582	12.47	64.81	72.74	63.71	72.44	72.74	73.18	69.94
38	89565	0.57	78.42	80.75	74.88	83.35	86.34	81.74	80.91
39	31439	10.02	65.90	74.90	64.82	74.03	74.38	74.83	71.48
40	51123	18.95	54.82	67.19	57.51	68.09	65.01	71.61	64.04
41	52455	17.23	61.83	70.89	60.70	67.60	68.87	69.67	66.59
42	41699	15.60	62.88	71.44	59.31	67.98	68.53	70.02	66.69
43	106469	12.36	64.50	73.11	63.46	72.25	72.67	72.70	69.78
44	21644	17.06	60.13	68.30	58.22	69.71	69.04	69.59	65.83
45	32497	9.33	67.37	74.71	66.98	76.49	76.47	76.27	73.05
46	23281	15.74	60.83	68.60	59.49	68.25	67.59	69.42	65.70
153	26376	0.50	79.44	80.03	74.67	83.56	83.83	80.84	80.39

REGION -S.CEN. ATTACK 43 INTEGRATED DOSE INTERVAL=0-999

POPULATION ITEM	TOTALS	PROMPT	15 DEC 51	25 DEC 51	15 MAY 51	15 JUN 51	5 JUL 52	25 NOV 50	SIX WIND AVERAGE
1	429332	0.55	92.01	93.74	90.39	87.43	85.57	83.83	88.83
3	169520	10.85	82.93	82.35	74.57	58.92	59.74	76.79	72.55
6	114777	15.57	81.10	78.98	68.58	49.08	50.40	75.09	67.20
7	151832	0.61	83.68	89.24	87.31	81.32	84.17	78.35	84.01
10	202207	11.30	83.11	82.11	74.45	57.73	58.49	77.81	72.28
12	142979	9.17	82.87	83.56	75.79	64.42	64.42	74.95	74.33
24	44549	14.56	81.79	80.44	69.63	47.67	49.15	75.46	67.36
25	25801	12.93	82.40	81.22	71.63	52.72	53.78	75.85	69.60
74	98472	16.76	78.85	78.34	68.55	47.07	49.14	71.41	65.56
94	71366	14.35	83.00	76.11	69.40	42.81	46.30	75.79	65.57
135	321592	0.36	92.80	94.61	91.75	88.49	87.30	85.97	90.15
148	365893	0.51	86.55	90.30	90.32	83.62	86.00	83.24	86.67
149	205064	0.38	85.02	88.42	91.80	83.94	89.29	82.91	86.90
150	20712	1.34	87.50	90.17	84.60	80.62	75.07	83.10	83.51
151	22774	0.90	70.98	87.60	85.92	84.95	78.36	83.83	81.94
152	117907	0.53	92.12	94.17	69.62	83.42	83.75	83.80	87.81
159	133425	0.52	83.00	85.92	91.54	80.63	85.69	78.10	84.15
37	56573	11.68	82.50	81.80	73.29	56.70	57.65	76.19	71.35
38	53441	0.79	85.61	69.43	88.38	81.96	83.65	81.31	85.06
39	42628	10.60	84.02	82.97	73.59	58.26	59.53	78.20	72.76
40	41752	12.04	82.17	80.67	70.37	46.57	46.34	71.85	66.33
41	49790	11.99	82.87	78.96	72.89	55.44	56.88	77.05	70.68
42	42478	14.92	80.84	79.41	70.22	51.37	51.74	73.24	67.80
43	117375	12.72	82.15	81.24	71.92	55.27	56.14	76.02	70.46
44	21910	17.20	79.27	78.12	63.84	43.75	44.99	72.34	63.72
45	32287	9.55	84.45	84.20	75.34	60.67	64.20	78.59	74.57
46	26182	15.27	81.05	80.11	66.42	52.92	50.96	74.84	67.72
153	14690	0.51	90.46	92.25	89.08	83.65	82.91	81.92	86.71

REGION -MOUNT. ATTACK 43 INTEGRATED DOSE INTERVAL=0-999

POPULATION ITEM	TOTALS	PROMPT	15 DEC 51	25 DEC 51	15 MAY 51	15 JUN 51	5 JUL 52	25 NOV 50	SIX WIND AVERAGE
1	656956	0.33	93.26	93.71	90.92	89.99	91.59	92.66	92.02
3	68547	7.69	85.11	85.73	79.47	73.98	71.87	85.26	80.24
6	46012	11.08	81.10	81.84	75.78	67.76	65.87	81.02	75.56
7	57070	0.41	92.33	94.66	87.72	89.79	87.97	93.19	90.94
10	87708	6.73	86.37	86.77	80.94	75.03	72.84	86.81	81.46
12	52764	10.04	82.51	83.67	77.19	73.58	71.84	82.61	78.57
24	23418	10.30	82.58	83.41	76.30	67.05	68.60	81.50	76.57
25	12139	9.52	83.15	83.98	77.12	69.82	69.82	82.73	77.77
74	35254	14.76	77.76	79.58	72.64	67.63	66.07	77.02	73.45
94	20764	15.94	77.93	79.52	73.93	62.05	66.05	78.66	73.02
135	413186	0.52	89.88	92.22	86.39	87.45	90.71	91.07	89.62
148	235616	0.62	89.15	91.66	84.11	86.09	77.76	90.05	86.47
149	98287	0.83	87.11	86.95	85.40	85.06	72.13	88.83	84.25
150	15279	0.35	97.78	98.61	86.94	92.28	83.17	96.83	92.60
151	4870	0.74	88.62	90.86	86.65	85.85	83.18	88.95	87.35
152	117207	0.48	89.77	94.74	82.56	86.16	81.55	90.23	87.50
159	50553	0.53	85.57	86.19	90.11	85.05	68.73	87.60	83.87
37	23309	8.69	84.29	85.13	78.77	72.62	71.56	84.09	79.41
38	22353	1.06	90.06	91.94	87.02	87.19	79.39	91.08	87.78
39	18373	6.63	86.15	86.62	78.36	73.02	70.72	85.59	80.08
40	16743	9.72	84.69	84.91	80.02	71.13	68.36	84.90	79.00
41	12782	14.66	79.46	81.50	76.21	65.34	70.07	81.26	75.64
42	18568	8.93	83.90	85.52	79.10	71.52	74.76	83.97	79.79
43	46771	9.33	83.09	84.48	78.23	71.64	71.02	83.21	78.61
44	9534	13.16	79.14	80.48	73.55	65.14	62.79	78.96	73.34
45	15536	7.42	85.00	85.01	78.14	75.70	73.01	85.16	80.34
46	16077	9.84	84.06	83.09	77.32	71.77	72.21	83.53	78.66
153	10596	0.47	90.39	94.19	85.51	87.21	87.56	91.02	89.31

REGION -N.WEST ATTACK 43 INTEGRATED DOSE INTERVAL=0-999

POPULATION ITEM	TOTALS	PROMPT	15 DEC 51	25 DEC 51	15 MAY 51	15 JUN 51	5 JUL 52	25 NOV 50	SIX WIND AVERAGE
1	162957	0.33	99.67	95.08	93.57	91.33	97.15	99.67	96.08
3	46222	16.83	82.73	82.54	68.98	81.02	81.13	83.17	79.93
6	30440	24.49	75.23	75.37	59.84	74.10	74.02	75.51	72.34
7	30091	0.78	99.22	97.16	84.04	91.50	97.12	99.22	94.71
10	50088	14.86	84.73	84.49	69.21	82.65	83.23	85.14	81.57
12	46262	20.24	79.28	79.14	68.13	78.25	77.59	79.76	77.02
24	18408	22.10	77.56	77.58	59.33	76.08	76.15	77.90	74.10
25	9248	20.00	79.61	79.52	64.72	78.01	78.07	80.00	76.65
74	24168	30.21	69.47	69.26	57.64	67.68	67.77	69.79	66.93
94	32311	25.98	73.87	73.66	60.61	72.80	72.63	74.02	71.26
135	62429	0.25	99.75	93.88	92.37	88.14	97.21	99.75	95.18
148	98111	0.53	99.47	97.66	83.04	87.96	97.82	99.47	94.24
149	57546	0.44	99.56	97.64	82.21	86.01	97.49	99.56	93.74
150	11300	1.11	98.89	98.51	87.60	90.66	98.32	98.89	95.48
151	5946	1.29	98.71	98.55	78.19	91.49	97.90	98.71	93.92
152	23327	0.30	99.70	97.08	84.12	90.53	98.37	99.70	94.92
159	36570	0.45	99.55	98.82	85.07	87.29	97.91	99.55	94.70
37	16370	18.99	80.57	80.40	66.54	78.93	78.89	81.01	77.72
38	10772	0.77	99.23	96.84	80.07	88.33	97.30	99.23	93.50
39	10784	14.88	84.35	84.64	70.47	91.48	82.24	85.12	81.38
40	27160	17.67	62.19	81.73	64.70	81.37	80.96	82.33	78.88
41	12484	18.46	81.34	81.38	70.29	80.56	79.73	81.54	79.14
42	12767	22.97	76.64	76.51	62.21	74.97	74.95	77.03	73.72
43	32594	20.91	78.65	78.59	64.54	76.97	77.19	79.09	75.84
44	6889	28.57	71.23	71.13	55.52	70.02	70.13	71.43	68.24
45	10321	16.63	82.46	82.75	70.34	81.42	80.96	83.37	80.22
46	8344	19.48	80.21	79.99	69.57	78.26	78.55	80.52	77.85
153	2504	0.40	99.60	96.13	90.06	92.57	98.04	99.60	96.00

U. S. TOTALS — ATTACK 43 — INTEGRATED DOSE INTERVAL=0-2999

POPULATION ITEM	TOTALS	PROMPT	15 DEC 51	25 DEC 51	15 MAY 51	15 JUN 51	5 JUL 52	25 NOV 50	SIX WIND AVERAGE
1	2971499	0.5	98.0	98.0	97.0	96.1	96.7	95.8	96.9
3	1784656	12.5	85.7	86.9	83.9	77.6	81.1	81.8	82.8
6	1246526	17.4	80.6	82.2	79.2	70.1	75.6	75.8	77.3
7	1343059	0.4	98.1	97.6	96.6	96.3	96.7	96.6	97.0
10	2019872	11.8	86.2	87.6	84.3	78.6	81.5	82.0	83.4
12	1653024	13.1	85.3	86.0	83.7	77.6	81.0	82.1	82.6
24	675084	15.0	83.1	84.6	81.1	70.7	78.1	77.2	79.1
25	329959	14.6	83.6	84.9	81.8	73.6	78.7	78.9	80.2
74	1103668	30.1	68.8	69.3	67.8	59.1	65.9	65.6	66.1
94	1387922	18.5	80.5	81.1	78.7	72.4	76.0	75.4	77.4
135	1750307	0.5	97.9	97.5	96.4	95.2	96.1	96.3	96.6
148	3039695	0.5	97.2	97.4	96.6	94.9	95.5	94.9	96.1
149	1331375	0.6	96.4	96.7	96.3	94.0	94.9	94.1	95.4
150	401179	0.5	97.8	98.8	97.3	95.1	96.2	94.5	96.6
151	225141	0.6	96.5	98.2	97.0	94.4	93.3	92.6	95.3
152	1076563	0.4	98.2	97.4	96.6	96.1	96.5	96.5	96.9
159	1961169	0.4	98.1	97.5	96.5	96.0	96.0	96.3	96.7
37	642352	13.6	84.7	85.7	83.0	76.1	80.1	80.7	81.7
38	424202	0.7	97.3	97.4	96.2	94.7	95.8	94.9	96.0
39	379219	10.9	86.8	88.4	85.0	78.9	81.8	83.2	84.0
40	982094	14.0	84.6	85.6	82.5	76.0	79.9	78.0	81.1
41	765932	13.1	85.8	86.4	84.3	76.1	80.7	82.7	82.7
42	443688	15.1	83.3	84.3	81.5	73.7	78.6	79.6	80.2
43	1174589	14.1	84.1	85.3	82.6	75.3	79.6	80.2	81.2
44	268623	17.5	80.8	81.9	79.2	68.3	75.9	76.9	77.2
45	337926	11.6	86.6	87.6	84.7	78.7	82.1	82.4	83.7
46	317218	17.8	80.3	81.5	77.1	69.9	74.2	75.4	76.4
153	92303	0.4	98.2	97.7	96.6	95.9	96.1	96.5	96.8

REGION -N.EAST — ATTACK 43 — INTEGRATED DOSE INTERVAL=0-2999

POPULATION ITEM	TOTALS	PROMPT	15 DEC 51	25 DEC 51	15 MAY 51	15 JUN 51	5 JUL 52	25 NOV 50	SIX WIND AVERAGE
1	163593	0.70	99.30	99.14	97.58	96.86	97.93	97.06	97.98
3	446779	14.06	85.94	85.83	83.18	68.99	78.44	84.00	81.06
6	357939	17.18	82.82	82.75	80.86	63.09	75.38	81.25	77.69
7	91118	0.58	99.42	99.33	97.61	97.17	98.24	95.12	97.81
10	465707	12.64	87.36	87.27	84.42	71.01	79.15	85.41	82.44
12	449988	15.75	84.25	84.07	81.50	68.48	76.61	82.22	79.52
24	204904	12.44	87.56	87.49	85.57	66.47	79.94	86.39	82.24
25	93456	14.79	85.21	85.12	82.87	66.93	77.80	83.57	80.25
74	384765	46.40	53.57	53.51	52.57	37.25	50.67	52.32	49.98
94	452781	20.32	79.68	79.66	78.08	67.89	72.98	77.37	75.94
135	56329	0.45	99.55	99.49	97.89	97.87	98.57	96.34	98.28
148	229209	0.83	99.17	99.09	97.01	96.17	97.60	95.61	97.44
149	66431	1.29	98.71	98.61	95.78	93.88	97.17	95.91	96.68
150	96556	0.47	99.53	99.53	98.27	97.64	98.10	96.94	98.33
151	40137	1.03	98.97	98.82	95.61	95.80	96.70	93.88	96.63
152	26105	0.70	99.30	99.12	97.64	97.12	98.28	92.56	97.34
159	164942	0.74	99.26	99.05	96.37	96.61	98.58	94.33	97.37
37	170972	15.07	84.93	84.85	82.61	67.52	77.59	82.96	80.08
38	34351	1.57	98.43	98.32	96.06	93.98	96.99	95.22	96.50
39	67191	11.41	88.59	88.38	85.46	72.02	80.31	86.56	83.55
40	305811	11.79	88.21	88.18	85.51	75.36	80.01	86.07	83.89
41	265616	14.80	85.20	85.15	83.63	66.31	77.25	82.96	80.08
42	118945	15.80	84.20	84.09	81.88	63.70	78.07	82.40	79.06
43	297900	15.89	84.11	84.01	81.71	65.23	77.12	82.24	79.07
44	86053	17.60	82.40	82.31	80.70	57.98	75.78	81.26	76.74
45	82973	13.61	86.39	86.31	84.10	70.97	78.22	84.79	81.80
46	77800	16.10	83.90	83.77	81.18	64.62	77.12	80.53	78.52
153	5010	0.40	99.60	99.58	97.98	97.98	98.74	95.99	98.31

POPULATION ITEM	TOTALS	PROMPT	15 DEC 51	25 DEC 51	15 MAY 51	15 JUN 51	5 JUL 52	25 NOV 50	SIX WIND AVERAGE
		REGION -S.EAST			ATTACK 43		INTEGRATED DOSE INTERVAL=0-2999		
1	447603	0.31	98.40	98.68	96.72	97.99	97.22	97.96	97.83
3	380213	8.65	89.10	90.78	86.33	87.22	81.54	87.69	87.11
6	206811	15.07	81.97	84.66	79.69	79.89	71.02	80.46	79.61
7	440215	0.22	97.52	98.40	95.73	97.64	97.47	96.83	97.26
10	439169	8.23	89.35	91.23	86.34	87.29	81.57	87.79	87.26
12	315169	8.67	89.23	90.56	87.55	88.24	82.79	88.35	87.79
24	93789	15.91	82.04	83.72	76.14	76.68	68.48	75.86	77.15
25	55109	12.36	85.46	87.15	81.70	82.33	74.97	82.63	82.37
74	152237	17.46	79.93	81.97	79.21	78.91	73.39	80.00	78.90
94	195435	10.17	87.61	89.39	87.72	87.92	81.82	85.41	86.64
135	236925	0.17	98.07	98.44	96.77	97.99	97.29	97.48	97.67
148	528412	0.25	98.25	97.84	96.19	95.96	94.48	95.41	96.35
149	293619	0.26	97.94	97.75	95.95	96.06	95.80	94.23	96.29
150	53851	0.36	98.02	98.05	93.74	93.44	91.69	97.00	95.32
151	71310	0.19	99.49	98.26	98.58	94.74	86.76	95.55	95.56
152	103448	0.2C	98.27	97.60	96.27	97.59	97.18	97.58	97.41
159	778310	0.22	98.47	98.43	95.95	96.93	95.65	97.80	97.20
37	126971	10.02	87.72	89.43	85.02	85.95	80.11	86.12	85.72
38	120665	0.39	97.63	98.22	95.73	96.74	96.16	96.09	96.76
39	87450	8.35	89.49	91.10	86.27	87.19	80.00	87.96	87.00
40	122760	9.51	88.35	90.22	86.09	87.83	80.34	85.52	86.39
41	183746	5.81	92.37	93.53	90.91	92.02	88.25	91.88	91.49
42	81201	12.25	84.83	87.24	81.96	82.98	75.09	83.92	82.67
43	227604	10.31	87.06	89.11	84.90	85.65	78.64	86.00	85.23
44	45079	14.41	83.03	85.24	79.87	80.99	72.09	80.98	80.37
45	66285	9.12	88.98	90.26	85.62	86.64	81.51	86.85	86.64
46	77608	23.19	75.06	76.42	65.26	65.32	60.65	69.26	68.66
153	13755	0.16	98.04	98.31	96.59	97.85	97.14	97.62	97.59

POPULATION ITEM	TOTALS	PROMPT	15 DEC 51	25 DEC 51	15 MAY 51	15 JUN 51	5 JUL 52	25 NOV 50	SIX WIND AVERAGE
		REGION -E.N.C.			ATTACK 43		INTEGRATED DOSE INTERVAL=0-2999		
1	244611	0.43	99.57	98.64	98.26	99.23	99.40	98.22	98.89
3	362252	15.55	84.45	83.83	81.12	84.15	83.03	76.80	82.23
6	264368	21.00	79.00	78.33	75.59	78.80	77.32	69.74	76.46
7	256227	0.17	99.83	99.00	98.15	99.45	99.73	98.25	99.07
10	424715	15.12	84.88	84.31	81.28	84.55	83.45	76.72	82.53
12	336007	15.49	84.51	83.73	81.71	84.26	83.26	78.66	82.69
24	157631	17.82	82.18	81.65	78.48	81.89	80.60	72.09	79.48
25	71985	17.00	83.00	82.39	79.51	82.71	81.49	74.51	80.60
74	215192	28.45	71.55	70.76	69.43	71.33	70.40	65.83	69.88
94	407382	19.30	80.70	80.13	77.13	80.42	78.84	73.35	78.43
135	161541	0.16	99.84	98.59	98.46	99.45	99.79	98.48	99.10
148	520343	0.30	99.70	98.29	98.33	99.28	99.58	98.50	98.95
149	191030	0.54	99.46	97.28	98.05	98.94	99.22	98.29	98.54
150	106538	0.15	99.85	99.74	98.81	99.61	99.78	98.54	99.39
151	26556	0.18	99.82	99.28	98.61	99.50	99.69	98.70	99.27
152	196279	0.17	99.83	98.36	98.30	99.40	99.81	98.65	99.06
159	423744	0.22	99.78	98.57	97.99	99.15	99.74	98.20	98.90
37	132985	16.58	83.42	82.77	80.12	83.13	82.00	76.01	81.24
38	67174	0.54	99.46	98.43	97.68	99.11	99.26	97.54	98.58
39	65183	14.29	85.71	84.99	81.87	85.34	84.53	78.93	83.56
40	325222	16.51	83.49	83.14	79.91	83.09	82.57	74.07	81.04
41	141252	17.11	82.89	82.27	79.37	82.72	79.02	78.07	80.72
42	66648	18.05	81.95	81.13	78.92	81.68	80.53	75.22	79.90
43	235700	17.03	82.97	82.26	79.70	82.68	81.61	75.60	80.80
44	46377	21.08	78.92	78.04	75.16	78.69	77.68	71.02	76.58
45	66371	13.30	86.70	86.04	83.61	86.34	85.53	77.37	84.26
46	50521	20.06	79.94	78.45	76.41	79.72	78.97	72.63	77.69
153	13672	0.15	99.85	99.01	98.52	99.55	99.81	98.51	99.21

REGION -W.N.C. ATTACK 43 INTEGRATED DOSE INTERVAL=0-2999

POPULATION ITEM	TOTALS	PROMPT	15 DEC 51	25 DEC 51	15 MAY 51	15 JUN 51	5 JUL 52	25 NOV 50	SIX WIND AVERAGE
1	509674	0.76	98.69	95.14	94.00	91.96	93.28	95.15	94.70
3	153950	11.40	88.31	85.36	85.22	84.00	82.32	86.44	85.27
6	90463	18.61	81.13	79.00	78.89	78.00	75.36	79.30	78.61
7	282916	0.50	99.21	95.11	95.39	93.43	94.69	96.99	95.80
10	175661	11.35	88.41	85.83	85.39	84.42	82.32	86.54	85.48
12	172661	11.26	88.37	84.66	85.10	83.52	83.05	86.63	85.22
24	44979	15.03	84.75	82.83	82.52	81.90	78.98	83.25	82.37
25	25952	13.74	85.99	83.51	83.22	82.29	79.90	84.28	83.20
74	92623	21.06	78.69	75.81	75.94	75.17	73.14	77.06	75.97
94	66723	26.50	73.30	71.77	72.22	71.46	65.91	72.29	71.16
135	440663	0.79	98.63	94.97	93.67	91.63	93.08	94.92	94.48
148	779900	0.52	99.18	95.72	94.99	94.05	95.20	97.11	96.04
149	247491	0.80	98.80	94.71	94.53	91.27	93.93	95.65	94.81
150	64587	0.36	99.45	96.94	96.53	93.42	95.47	96.88	96.45
151	32569	0.24	99.51	97.33	96.78	95.30	95.66	98.35	97.15
152	435310	0.41	99.34	95.99	94.89	95.64	95.84	97.88	96.60
159	263030	0.57	99.14	92.38	95.07	91.13	93.60	96.31	94.60
37	55582	12.47	87.25	84.37	84.35	83.09	81.56	85.37	84.33
38	69565	0.57	99.13	95.41	95.42	93.63	94.88	96.96	95.90
39	31439	10.02	89.72	86.29	86.17	84.97	83.75	87.52	86.40
40	51123	18.95	80.85	78.77	79.36	78.44	71.20	80.12	78.12
41	52455	17.23	82.52	79.98	80.34	78.80	77.90	80.83	80.06
42	41699	15.60	84.10	81.77	81.21	79.81	78.97	81.94	81.30
43	108469	12.36	87.34	84.75	84.29	82.95	81.71	85.13	84.36
44	21644	17.06	82.76	80.33	80.53	79.71	77.21	80.84	80.23
45	32497	9.33	90.33	86.39	86.39	86.00	85.05	88.14	87.05
46	23281	15.74	84.03	80.58	81.27	80.01	77.90	82.17	80.99
153	28376	0.50	99.12	95.27	94.41	93.73	94.34	96.55	95.57

REGION -S.CEN. ATTACK 43 INTEGRATED DOSE INTERVAL=0-2999

POPULATION ITEM	TOTALS	PROMPT	15 DEC 51	25 DEC 51	15 MAY 51	15 JUN 51	5 JUL 52	25 NOV 50	SIX WIND AVERAGE
1	429332	0.55	97.90	98.46	98.13	95.96	95.07	97.31	97.14
3	169520	10.85	87.58	87.98	87.46	84.48	81.31	86.94	85.96
6	114777	15.57	83.49	63.82	82.67	79.87	76.33	82.89	81.51
7	151832	0.61	95.57	96.01	97.96	92.48	93.34	95.31	95.11
10	202207	11.30	87.15	87.56	86.89	84.03	80.86	86.64	85.52
12	142979	9.17	88.96	89.59	89.45	86.01	83.21	88.06	87.55
24	44549	14.56	84.29	84.88	83.66	81.04	77.27	83.81	82.49
25	25801	12.93	85.83	86.30	85.39	82.47	78.91	85.19	84.01
74	98472	16.76	81.90	82.60	82.51	78.78	75.87	82.09	80.62
94	71366	14.35	84.92	85.09	82.79	81.90	75.03	82.75	82.08
135	321592	0.36	98.16	98.62	98.85	96.11	95.96	97.71	97.57
148	365893	0.51	95.78	95.55	98.85	92.53	94.37	96.05	95.52
149	205064	0.38	95.54	93.16	99.36	90.83	94.81	94.83	94.75
150	20712	1.34	95.35	98.43	97.45	94.34	89.56	96.25	95.23
151	22774	0.90	87.80	96.77	95.71	96.14	95.27	97.73	94.90
152	117907	0.53	97.82	98.98	98.82	94.51	94.31	97.82	97.04
159	133425	0.52	95.34	94.35	98.86	90.57	92.89	93.25	94.21
37	56573	11.68	86.85	87.27	86.71	83.65	80.24	86.20	85.15
38	55441	0.79	95.72	95.89	98.07	92.97	93.83	95.74	95.37
39	42628	10.60	88.08	88.57	87.51	84.74	81.58	87.43	86.32
40	41752	12.04	86.84	86.72	85.92	83.56	75.12	85.32	83.91
41	49790	11.99	86.61	87.15	86.03	83.58	80.16	85.38	84.82
42	42478	14.92	83.96	84.50	82.77	80.72	76.67	83.18	81.97
43	117375	12.72	86.02	86.34	85.67	82.56	79.67	85.36	84.27
44	21910	17.20	81.92	82.20	80.94	77.81	74.71	81.24	79.80
45	32267	9.55	88.79	89.62	89.22	85.80	82.59	88.59	87.43
46	28182	15.27	83.87	84.14	83.25	80.40	76.99	83.28	81.99
153	14690	0.51	97.67	99.01	98.64	95.58	94.27	97.49	97.11

REGION -MOUNT. ATTACK 43 INTEGRATED DOSE INTERVAL=0-2999

POPULATION ITEM	TOTALS	PROMPT	15 DEC 51	25 DEC 51	15 MAY 51	15 JUN 51	5 JUL 52	25 NOV 50	SIX WIND AVERAGE
1	656956	0.33	97.89	98.36	97.21	96.37	98.07	96.64	97.42
3	68547	7.69	87.64	92.22	87.04	86.93	87.61	87.16	88.10
6	46012	11.08	83.33	88.92	82.37	82.79	83.28	82.90	83.93
7	57070	0.41	98.38	98.76	97.08	95.69	97.93	96.55	97.40
10	87708	6.73	88.81	93.20	88.19	88.14	88.70	88.43	89.24
12	52764	10.04	85.49	89.82	84.57	84.53	85.67	84.91	85.83
24	23418	10.30	84.96	89.64	84.17	84.41	85.12	84.44	85.46
25	12139	9.52	85.65	90.40	84.89	85.00	85.78	85.17	86.15
74	35254	14.78	81.13	85.13	79.68	80.16	81.29	80.30	81.28
94	20764	15.94	79.96	84.06	77.77	79.74	79.78	79.67	80.16
135	413186	0.52	96.78	97.50	95.63	94.09	97.12	96.26	96.23
148	235616	0.62	97.64	98.14	96.33	94.37	95.97	93.78	96.04
149	98287	0.83	96.94	97.67	95.70	93.89	93.26	91.66	94.85
150	15279	0.35	99.23	99.40	98.65	97.47	99.37	98.74	98.81
151	4870	0.74	94.56	98.89	94.29	91.91	93.72	93.57	94.49
152	117207	0.48	98.15	98.33	96.65	94.47	97.90	94.93	96.74
159	50553	0.53	96.88	97.94	96.16	95.64	93.50	89.71	94.97
37	23309	3.69	86.93	91.21	86.22	86.21	86.93	86.27	87.29
38	22353	1.06	97.14	97.89	95.89	94.61	96.35	94.32	96.03
39	18373	6.63	88.30	93.31	87.48	87.69	88.37	87.77	88.82
40	16743	9.72	85.46	90.28	84.83	85.31	85.77	85.76	86.23
41	12762	14.66	82.57	85.24	81.61	82.15	82.65	82.39	82.77
42	16568	8.93	87.19	91.00	86.32	86.54	87.44	86.28	87.46
43	46771	9.33	86.20	90.59	85.28	85.37	86.32	85.36	86.52
44	9534	13.16	81.62	86.78	80.49	81.12	81.67	81.18	82.14
45	15536	7.42	87.33	92.46	86.79	86.64	87.33	86.88	87.90
46	16077	9.84	85.92	90.09	85.88	85.33	86.68	85.58	86.58
153	10596	0.47	97.97	98.22	96.22	94.42	98.21	95.72	96.79

REGION -N.WEST ATTACK 43 INTEGRATED DOSE INTERVAL=0-2999

POPULATION ITEM	TOTALS	PROMPT	15 DEC 51	25 DEC 51	15 MAY 51	15 JUN 51	5 JUL 52	25 NOV 50	SIX WIND AVERAGE
1	162957	0.33	99.67	99.67	99.67	99.67	99.67	99.67	99.67
3	46222	16.83	83.17	83.17	83.17	83.17	83.17	83.17	83.17
5	30440	24.49	75.51	75.51	75.51	75.51	75.51	75.51	75.51
7	30091	0.78	99.22	99.22	99.22	99.22	99.22	99.22	99.22
10	50068	14.86	85.14	85.14	85.14	85.14	85.14	85.14	85.14
12	46262	20.24	79.76	79.76	79.76	79.76	79.76	79.76	79.76
24	16408	22.10	77.90	77.90	77.90	77.90	77.90	77.90	77.90
25	9248	20.00	80.00	80.00	80.00	80.00	80.00	80.00	80.00
74	24168	30.21	69.79	69.79	69.79	69.79	69.79	69.79	69.79
94	32311	25.98	74.02	74.02	74.02	74.02	74.02	74.02	74.02
135	62429	0.25	99.75	99.75	99.75	99.75	99.75	99.75	99.75
148	98111	0.53	99.47	99.47	99.47	99.47	99.47	99.47	99.47
149	57546	0.44	99.56	99.56	99.56	99.56	99.56	99.56	99.56
150	11300	1.11	98.89	98.89	98.89	98.89	98.89	98.89	98.89
151	5946	1.29	98.71	98.71	98.71	98.71	98.71	98.71	98.71
152	23327	0.30	99.70	99.70	99.70	99.70	99.70	99.70	99.70
159	36570	0.45	99.55	99.55	99.55	99.55	99.55	99.55	99.55
37	16370	18.99	81.01	81.01	81.01	81.01	81.01	81.01	81.01
38	10772	0.77	99.23	99.23	99.23	99.23	99.23	99.23	99.23
39	10784	14.88	85.12	85.12	85.12	85.12	85.12	85.12	85.12
40	27160	17.67	82.33	82.33	82.33	82.33	82.33	82.33	82.33
41	12484	18.46	81.54	81.54	81.54	81.54	81.54	81.54	81.54
42	12767	22.97	77.03	77.03	77.03	77.03	77.03	77.03	77.03
43	32594	20.91	79.09	79.09	79.09	79.09	79.09	79.09	79.09
44	6889	28.57	71.43	71.43	71.43	71.43	71.43	71.43	71.43
45	10321	16.63	83.37	83.37	83.37	83.37	83.37	83.37	83.37
46	8344	19.48	80.52	80.52	80.52	80.52	80.52	80.52	80.52
153	2504	0.40	99.60	99.60	99.60	99.60	99.60	99.60	99.60

U. S. TOTALS — ATTACK 130 — INTEGRATED DOSE INTERVAL=0-999

POPULATION ITEM	TOTALS	PROMPT	15 DEC 51	25 DEC 51	15 MAY 51	15 JUN 51	5 JUL 52	25 NOV 50	SIX WIND AVERAGE
1	2971499	2.1	53.2	56.9	64.6	67.1	64.5	59.0	60.9
3	1784656	4.1	31.9	54.2	59.4	65.9	65.5	52.0	54.8
6	1246526	4.9	29.8	53.5	58.1	64.5	63.6	49.2	53.1
7	1343059	1.6	34.6	50.1	58.9	66.3	68.3	58.4	56.1
10	2019872	4.3	32.4	54.0	59.5	65.6	65.6	52.7	55.0
12	1653024	3.4	32.4	53.9	59.2	66.4	65.2	51.7	54.8
24	675084	4.8	28.1	54.4	58.9	65.9	63.6	50.8	53.6
25	329959	4.4	30.4	54.4	58.8	66.1	64.6	51.2	54.3
74	1103668	3.5	27.1	56.1	56.5	71.5	67.1	45.0	53.9
94	1387922	2.5	27.5	57.8	61.9	71.3	72.6	54.4	57.6
135	1750307	2.7	48.5	52.9	60.7	63.8	61.1	55.1	57.0
148	3039695	2.1	41.7	47.9	54.6	63.6	63.3	54.7	54.3
149	1331375	2.3	43.7	47.1	55.4	61.7	66.0	54.0	54.6
150	401179	1.5	38.4	55.0	58.4	64.6	62.3	59.0	56.3
151	225141	1.7	36.1	54.0	61.6	64.2	61.7	54.9	55.4
152	1076563	2.0	41.8	45.4	50.5	65.3	60.5	54.2	52.9
159	1961169	1.5	40.3	51.6	59.5	68.8	71.6	58.2	58.3
37	642352	3.9	31.4	54.3	59.1	66.3	65.6	51.4	54.7
38	424202	1.9	37.4	50.1	57.0	63.5	65.2	55.2	54.7
39	379219	4.4	33.4	54.4	57.9	64.6	63.8	51.1	54.2
40	982094	2.8	30.1	57.8	65.7	71.2	71.3	58.5	59.1
41	765932	2.6	26.8	55.3	58.4	68.3	68.6	48.9	54.4
42	443688	3.9	31.7	53.6	59.3	66.3	54.7	50.9	54.4
43	1174589	3.9	32.4	54.0	58.8	65.9	64.7	51.1	54.5
44	268623	4.3	29.5	52.6	55.2	63.8	61.8	46.8	51.6
45	337926	4.2	33.2	54.1	58.4	65.8	65.1	52.4	54.8
46	317218	10.1	30.6	48.1	52.0	58.3	56.4	44.3	48.3
153	92303	2.0	39.9	49.5	56.8	61.7	61.3	52.9	53.7

REGION -N.EAST — ATTACK 130 — INTEGRATED DOSE INTERVAL=0-999

POPULATION ITEM	TOTALS	PROMPT	15 DEC 51	25 DEC 51	15 MAY 51	15 JUN 51	5 JUL 52	25 NOV 50	SIX WIND AVERAGE
1	163593	1.2	62.5	82.9	83.5	83.1	80.4	42.2	72.4
3	446779	2.1	19.6	55.7	59.8	68.6	63.7	26.1	48.9
6	357939	2.0	15.0	52.1	56.4	66.9	61.2	23.6	45.9
7	91118	1.4	50.7	74.8	81.0	81.6	77.4	29.6	65.8
10	465707	2.2	20.5	55.6	60.7	68.5	63.9	27.6	49.5
12	449988	2.0	20.9	56.8	59.1	68.0	63.8	25.2	49.0
24	204904	1.8	13.8	53.8	58.6	71.4	62.2	25.5	47.6
25	93456	1.9	16.7	55.5	58.2	70.0	63.5	25.3	48.2
74	384765	1.0	11.4	59.5	46.8	81.7	67.4	15.7	47.1
94	452781	1.7	18.2	59.6	54.5	69.4	69.7	23.8	49.2
135	56329	1.2	60.2	80.7	82.7	82.7	78.5	32.1	69.5
148	229209	2.1	44.1	71.5	75.5	78.4	73.4	28.8	62.0
149	66431	3.2	33.4	63.4	75.2	77.6	74.1	32.1	59.3
150	96556	1.1	57.1	80.9	77.5	80.2	75.9	25.3	66.2
151	40137	2.8	33.2	66.1	67.6	72.3	63.6	35.3	56.3
152	26105	1.4	40.0	65.8	81.2	82.6	77.6	23.8	61.8
159	164942	2.3	40.9	69.2	79.3	81.7	77.3	30.7	63.2
37	170972	1.9	18.2	55.2	58.5	68.3	63.1	24.2	47.9
38	34351	2.0	42.5	72.1	75.4	78.1	74.2	28.7	61.8
39	87191	2.1	18.8	55.9	60.8	69.4	63.1	27.8	49.3
40	305811	1.9	22.2	58.7	62.7	69.6	67.9	31.4	52.1
41	265616	2.0	14.7	51.4	54.9	64.1	60.4	16.7	43.7
42	118945	1.6	17.2	53.6	59.3	69.0	61.1	24.1	47.4
43	297900	1.9	17.8	54.2	59.0	69.0	62.2	24.3	47.7
44	86053	1.8	11.7	50.6	51.4	64.6	57.5	20.7	42.7
45	82973	2.2	21.4	57.4	59.6	68.8	63.0	25.7	49.3
46	77800	2.6	17.6	51.0	57.3	65.9	58.0	21.2	45.1
153	5010	1.0	57.0	78.9	81.1	82.8	78.5	28.6	67.8

REGION -S.EAST ATTACK 130 INTEGRATED DOSE INTERVAL=0-999

POPULATION ITEM	TOTALS	PROMPT	15 DEC 51	25 DEC 51	15 MAY 51	15 JUN 51	5 JUL 52	25 NOV 50	SIX WIND AVERAGE
1	447603	0.9	33.2	61.5	67.0	72.1	79.8	57.2	61.8
3	380213	7.6	31.2	53.7	58.6	68.0	69.1	54.9	55.9
6	206811	12.2	33.4	49.2	54.4	63.2	62.3	49.0	51.9
7	440215	0.8	25.0	56.4	62.0	70.8	78.2	60.4	58.8
10	439169	7.9	31.1	52.8	57.9	66.4	68.2	53.4	55.0
12	315169	6.0	33.0	55.2	61.0	70.5	69.7	55.7	57.5
24	93789	15.3	29.2	44.9	50.8	59.6	58.2	47.4	48.3
25	55109	10.9	31.2	50.4	55.3	65.1	64.5	52.5	53.2
74	152237	11.2	31.9	49.2	57.5	66.2	65.8	52.4	53.8
94	195435	3.9	25.0	53.7	56.5	73.2	73.7	59.1	56.9
135	236925	0.6	30.7	56.6	66.7	68.7	79.0	56.2	59.7
148	528412	0.8	32.9	51.6	63.0	65.6	73.6	53.4	56.7
149	293619	0.9	36.8	49.6	58.8	63.4	72.1	50.7	55.2
150	53851	1.3	24.4	52.1	62.9	64.0	71.1	57.6	55.3
151	71310	0.3	38.6	63.1	72.6	68.6	72.7	58.6	62.3
152	103448	0.7	24.6	52.5	65.8	68.4	78.2	58.7	58.0
159	778310	0.8	38.5	58.8	58.2	66.1	74.6	52.0	58.0
37	128971	8.1	31.8	54.0	57.5	67.8	68.9	54.9	55.8
38	120665	1.0	30.7	55.6	60.7	68.1	75.4	56.5	57.8
39	87450	7.8	34.8	54.7	57.9	68.7	67.8	55.2	56.5
40	122760	5.1	27.9	54.5	60.3	69.9	70.2	55.5	56.4
41	183746	3.4	31.5	62.3	59.2	77.0	78.8	65.0	62.3
42	81201	8.8	31.6	51.2	58.6	66.6	67.2	55.0	55.0
43	227604	7.9	34.2	54.1	58.0	67.7	67.9	54.3	56.0
44	45079	10.5	37.5	52.5	54.2	65.2	63.8	52.0	54.2
45	66285	8.5	30.8	54.1	57.0	68.3	69.6	54.0	55.6
46	77608	28.0	23.1	35.9	42.0	46.6	46.7	35.8	38.4
153	13755	0.6	26.1	54.3	70.7	66.6	79.3	55.9	58.8

REGION -E.N.C. ATTACK 130 INTEGRATED DOSE INTERVAL=0-999

POPULATION ITEM	TOTALS	PROMPT	15 DEC 51	25 DEC 51	15 MAY 51	15 JUN 51	5 JUL 52	25 NOV 50	SIX WIND AVERAGE
1	244811	0.1	47.7	50.1	65.9	75.7	74.4	95.8	68.2
3	362252	0.0	35.2	61.2	82.6	91.8	93.6	97.1	76.9
6	264368	0.	32.7	64.7	85.6	94.1	96.0	97.2	78.4
7	256227	0.1	40.4	46.8	67.7	79.4	82.2	95.8	68.7
10	424715	0.0	34.7	61.1	82.8	91.9	93.6	97.1	76.9
12	336007	0.0	36.7	59.7	80.8	90.4	92.4	96.7	76.1
24	157831	0.	31.3	64.9	85.2	94.7	96.3	97.5	78.3
25	71985	0.0	33.7	62.6	83.9	93.2	94.9	97.2	77.6
74	215192	0.0	30.5	66.9	87.5	94.1	95.8	97.6	78.7
94	407382	0.	33.4	63.1	86.4	93.8	96.6	97.3	78.4
135	161541	0.1	42.6	45.9	64.6	78.4	80.3	94.3	67.7
148	520343	0.1	44.8	43.4	61.0	77.5	80.9	92.4	66.7
149	191030	0.0	50.8	39.9	71.7	85.2	87.1	92.3	71.2
150	106538	0.1	29.5	42.4	52.1	63.5	70.2	98.4	59.4
151	26556	0.0	38.1	45.7	71.9	82.9	83.2	96.6	69.7
152	196279	0.1	48.2	47.0	54.0	76.7	80.4	88.8	65.9
159	423744	0.0	47.8	43.3	74.4	85.6	87.0	94.6	72.1
37	132985	0.0	34.9	61.5	82.8	92.1	93.9	97.0	77.1
38	67174	0.1	40.7	45.8	63.2	76.7	80.0	95.2	66.9
39	65183	0.0	35.7	61.1	81.1	91.9	93.3	97.0	76.7
40	325222	0.	34.7	61.7	86.4	94.3	96.4	97.1	78.4
41	141252	0.	33.4	60.9	82.3	90.9	93.8	97.9	76.5
42	88648	0.0	34.2	63.2	84.1	92.7	94.7	97.1	77.7
43	235700	0.0	35.0	61.5	82.8	92.1	94.0	97.0	77.1
44	48377	0.	32.7	65.2	84.7	93.7	95.6	97.0	78.2
45	66371	0.0	36.5	60.2	81.5	92.4	92.5	97.4	76.7
46	50521	0.0	38.0	64.4	83.8	93.5	94.4	96.6	78.4
153	13672	0.1	37.9	45.7	54.4	70.7	74.7	94.1	62.9

REGION -W.N.C. ATTACK 130 INTEGRATED DOSE INTERVAL=0-999

POPULATION ITEM	TOTALS	PROMPT	15 DEC 51	25 DEC 51	15 MAY 51	15 JUN 51	5 JUL 52	25 NOV 50	SIX WIND AVERAGE
1	509674	5.4	28.4	28.5	44.9	47.3	38.1	39.7	37.8
3	153950	3.6	18.2	19.1	23.8	59.5	41.6	50.1	35.4
6	90463	3.2	14.9	12.0	15.3	61.6	41.2	53.5	33.1
7	282916	3.6	23.8	29.3	38.1	58.8	42.5	43.7	39.4
10	175861	3.7	18.1	17.9	23.1	59.4	40.8	51.0	35.1
12	172061	3.5	18.9	21.3	25.8	60.1	43.0	49.2	36.4
24	44979	3.2	15.4	12.6	15.2	62.8	41.8	54.3	33.7
25	25952	3.4	16.9	16.0	19.5	60.7	41.7	51.8	34.4
74	92623	3.2	16.3	15.7	19.6	60.5	43.0	49.5	34.1
94	86723	2.4	13.1	10.8	9.8	65.5	45.5	60.2	34.1
135	440663	5.8	25.7	29.3	43.3	49.1	39.6	35.7	37.1
148	779900	3.6	26.7	29.1	36.7	61.4	46.7	39.8	40.1
149	247491	5.5	22.0	26.2	34.6	60.4	49.8	38.0	38.5
150	64587	2.6	15.7	29.6	42.3	61.7	35.2	54.0	39.7
151	32569	1.9	25.7	34.1	43.5	68.5	38.2	47.4	42.9
152	435310	2.8	31.1	30.3	36.6	61.3	47.2	38.2	40.8
159	263030	4.4	17.1	27.3	29.2	64.4	46.6	45.8	38.4
37	55582	3.4	17.9	18.4	23.0	60.3	41.9	50.3	35.3
38	89565	3.6	24.1	28.8	38.7	59.4	43.2	42.7	39.5
39	31439	3.9	17.2	18.8	23.6	58.3	41.2	48.6	34.6
40	51123	2.7	13.3	13.6	9.9	65.5	47.1	63.3	35.4
41	52455	3.1	14.6	16.1	16.0	63.3	44.4	54.9	34.9
42	41699	3.8	15.5	15.1	20.2	56.8	38.7	48.7	32.5
43	108469	3.3	17.9	18.2	22.8	59.9	40.8	48.8	34.7
44	21644	3.4	15.8	12.0	15.4	61.2	39.9	49.3	32.3
45	32497	3.2	20.0	18.5	26.5	61.0	41.7	51.4	36.5
46	23281	3.6	16.5	15.1	20.2	57.1	40.3	47.6	32.8
153	28376	3.5	25.8	30.7	42.2	56.1	42.4	38.5	39.3

REGION -S.CEN. ATTACK 130 INTEGRATED DOSE INTERVAL=0-999

POPULATION ITEM	TOTALS	PROMPT	15 DEC 51	25 DEC 51	15 MAY 51	15 JUN 51	5 JUL 52	25 NOV 50	SIX WIND AVERAGE
1	429332	1.2	47.2	55.3	66.6	54.2	59.1	35.7	53.0
3	169520	5.1	41.4	56.5	55.3	41.7	61.0	19.0	45.8
6	114777	6.4	45.2	60.0	53.8	44.8	62.7	18.7	47.5
7	151832	1.8	31.9	44.3	59.7	34.2	59.9	22.1	42.0
10	202207	5.4	41.9	57.9	57.2	42.2	62.9	18.8	46.8
12	142979	4.2	39.7	53.3	51.9	39.4	55.9	19.8	43.3
24	44549	5.6	45.5	59.5	53.9	45.4	64.9	17.5	47.8
25	25801	5.4	44.0	57.9	53.7	43.8	62.0	18.3	46.6
74	98472	5.4	43.9	56.9	52.0	44.0	62.4	16.8	46.0
94	71366	5.7	38.7	61.7	55.8	47.5	69.6	9.5	47.1
135	321592	1.0	52.6	58.0	69.7	59.7	60.3	40.0	56.7
148	365893	1.4	41.6	47.2	64.1	43.5	61.1	30.7	48.0
149	205064	1.1	41.6	41.8	67.6	40.2	67.4	28.7	47.9
150	20712	2.8	34.8	53.6	54.5	39.1	51.3	26.1	43.2
151	22774	2.7	20.5	36.7	56.8	31.0	47.9	39.1	38.7
152	117907	1.5	46.8	57.7	61.2	52.7	54.6	33.8	51.1
159	133425	1.4	31.9	40.3	65.8	33.7	61.5	23.1	42.7
37	56573	4.9	42.4	56.9	54.3	42.9	61.7	19.4	46.3
38	53441	1.6	37.9	48.2	63.2	39.8	62.6	27.4	46.5
39	42628	4.7	41.4	56.8	55.2	42.4	62.6	19.7	46.4
40	41752	6.1	42.2	53.7	45.9	37.3	55.0	12.3	41.1
41	49790	4.5	39.7	60.3	56.3	45.2	67.7	14.8	47.3
42	42478	5.6	45.0	59.6	56.1	46.3	62.6	16.7	47.7
43	117375	5.2	43.7	57.6	54.0	43.3	61.7	20.0	46.7
44	21910	5.6	46.8	57.2	48.8	41.8	63.1	17.3	45.8
45	32287	4.8	38.7	55.1	55.3	40.7	62.9	22.3	45.8
46	28182	6.8	44.7	59.6	43.8	40.9	53.5	23.7	44.4
153	14690	1.4	40.6	53.6	60.2	46.2	58.5	28.1	47.9

REGION -MOUNT. ATTACK 130 INTEGRATED DOSE INTERVAL=0-999

POPULATION ITEM	TOTALS	PROMPT	15 DEC 51	25 DEC 51	15 MAY 51	15 JUN 51	5 JUL 52	25 NOV 50	SIX WIND AVERAGE
1	856956	2.1	76.1	62.4	71.6	78.4	67.9	68.7	70.9
3	68547	3.2	77.4	57.1	57.1	72.3	59.5	65.9	64.9
6	46012	3.3	77.0	53.8	52.2	71.4	57.7	63.4	62.6
7	57070	2.9	78.7	67.1	71.9	77.2	65.6	71.6	72.0
10	87708	3.1	77.8	56.4	57.4	72.9	59.6	65.5	64.9
12	52764	3.3	77.5	59.3	58.6	72.8	61.6	67.4	66.2
24	23418	3.2	78.3	58.0	50.9	70.7	57.6	64.8	63.4
25	12139	3.3	77.4	57.3	54.1	71.2	58.9	65.1	64.0
74	35254	3.4	78.4	57.6	53.8	72.1	60.1	65.4	64.6
94	20764	4.2	75.0	57.3	49.2	75.5	64.7	60.4	63.7
135	413186	3.6	74.1	62.9	65.9	72.5	63.4	67.6	67.8
148	235616	3.4	76.5	58.7	65.5	72.8	58.5	68.9	66.8
149	98287	3.7	75.9	51.3	62.9	70.2	50.2	68.2	63.1
150	15279	1.7	88.6	68.4	77.5	84.6	64.1	78.4	76.9
151	4870	3.1	77.0	56.2	77.2	77.4	62.5	61.5	68.6
152	117207	3.4	75.4	63.7	65.5	73.3	64.5	68.5	68.5
159	50553	2.9	75.5	52.3	66.7	71.3	53.9	68.2	64.6
37	23309	3.0	77.7	57.9	56.8	72.5	60.4	65.7	65.2
38	22353	3.1	78.0	60.5	69.5	74.8	59.4	71.2	68.9
39	18373	3.4	77.0	57.6	56.9	71.2	56.4	66.0	64.2
40	16743	2.1	74.2	48.8	53.9	73.4	55.6	63.5	61.5
41	12782	2.2	83.6	63.0	54.6	80.5	70.7	69.9	70.4
42	18568	2.9	78.6	62.2	57.3	71.7	64.8	64.5	66.5
43	46771	3.0	78.1	57.0	56.4	72.7	60.9	65.7	65.1
44	9534	3.4	79.6	54.5	51.4	72.3	58.5	66.4	63.8
45	15536	3.5	76.9	57.7	59.7	73.9	60.2	66.4	65.8
46	16077	3.5	79.9	57.6	55.1	71.6	61.4	60.2	64.3
153	10596	3.6	74.7	65.1	68.2	72.2	65.7	68.0	69.0

REGION -N.WEST ATTACK 130 INTEGRATED DOSE INTERVAL=0-999

POPULATION ITEM	TOTALS	PROMPT	15 DEC 51	25 DEC 51	15 MAY 51	15 JUN 51	5 JUL 52	25 NOV 50	SIX WIND AVERAGE
1	162957	0.7	81.0	87.8	75.9	75.6	77.6	96.1	82.3
3	46222	2.0	87.4	89.9	49.5	70.9	74.9	97.5	78.3
6	30440	1.9	89.8	89.9	43.6	71.8	75.3	98.0	78.1
7	30091	1.2	76.2	89.1	66.8	67.8	76.7	97.0	78.9
10	50088	2.1	86.8	89.6	47.8	69.6	71.8	97.4	77.2
12	46262	1.7	89.1	89.6	52.2	72.6	78.1	97.7	79.9
24	18408	2.0	89.1	91.1	42.9	74.1	72.6	97.8	77.9
25	9248	1.9	88.6	90.5	47.3	72.8	74.9	97.7	78.6
74	24168	1.3	89.9	90.4	47.3	75.2	81.5	98.2	80.4
94	32311	1.2	94.2	92.5	51.6	81.6	81.6	98.5	83.3
135	62429	0.7	71.1	86.8	61.8	61.1	69.7	94.2	74.1
148	98111	1.0	64.6	90.4	54.3	51.7	71.0	97.4	71.6
149	57546	0.8	57.3	89.8	47.0	41.2	67.8	97.3	66.7
150	11300	1.8	88.7	88.2	76.0	78.7	74.6	97.8	84.0
151	5946	2.0	88.8	90.4	69.9	79.2	81.1	97.9	84.5
152	23327	0.6	64.7	93.0	57.6	57.6	74.5	97.1	74.1
159	36570	0.8	67.4	94.8	60.3	55.3	75.5	98.5	75.3
37	16370	1.8	87.8	90.5	49.5	72.7	75.8	97.7	79.0
38	10772	1.1	70.9	86.5	59.0	59.9	72.9	96.7	74.3
39	10784	1.9	83.9	89.6	48.0	67.9	71.2	97.7	76.4
40	27160	2.0	94.8	93.1	51.5	83.2	74.4	97.5	82.4
41	12484	1.5	84.3	92.8	51.2	68.8	80.8	98.3	79.4
42	12767	1.7	88.2	89.8	47.8	72.4	75.1	97.9	78.5
43	32594	1.8	88.0	89.5	48.5	72.0	75.2	97.8	78.5
44	6889	1.8	91.4	90.4	43.8	75.6	76.9	98.0	79.3
45	10321	1.7	87.9	91.1	50.2	70.8	77.0	97.7	79.1
46	8344	2.2	88.2	89.7	48.4	69.2	77.7	97.3	78.4
153	2504	0.8	77.2	90.3	69.2	70.0	76.1	96.3	79.8

POPULATION ITEM	TOTALS	PROMPT	15 DEC 51	25 DEC 51	15 MAY 51	15 JUN 51	5 JUL 52	25 NOV 50	SIX WIND AVERAGE
U. S. TOTALS			ATTACK 130			INTEGRATED DOSE INTERVAL=0-2999			
1	2971499	2.1	73.7	78.3	78.9	79.2	77.4	73.7	76.9
3	1784656	4.1	54.8	80.4	78.9	77.0	77.5	71.8	73.4
6	1246526	4.9	51.2	81.0	79.2	75.3	75.9	71.2	72.3
7	1343059	1.6	59.2	72.7	74.1	79.1	80.9	70.2	72.7
10	2019872	4.3	56.0	79.7	78.2	76.6	77.2	71.4	73.2
12	1653024	3.4	54.0	80.2	79.1	77.6	77.6	72.2	73.5
24	675084	4.8	48.1	81.0	79.9	75.2	76.1	71.9	72.0
25	329959	4.4	51.3	80.7	79.3	76.1	76.7	72.1	72.7
74	1103668	3.5	44.8	83.7	82.4	78.7	79.9	74.8	74.1
94	1387922	2.5	49.4	83.4	83.9	80.7	81.8	75.5	75.8
135	1750307	2.7	68.3	73.9	75.0	75.7	74.2	69.5	72.8
148	3039695	2.1	62.0	69.2	72.0	76.8	76.7	68.1	70.8
149	1331375	2.3	65.7	69.5	73.8	75.7	78.1	68.2	71.8
150	401179	1.5	58.0	75.1	74.6	78.8	78.9	72.5	73.0
151	225141	1.7	58.5	77.9	76.4	77.1	74.8	67.8	72.1
152	1076563	2.0	60.0	64.6	67.8	77.2	74.4	66.2	68.4
159	1961169	1.5	65.0	73.5	75.5	82.9	83.0	70.9	75.1
37	642352	3.9	53.3	80.8	79.3	77.1	77.6	71.9	73.3
38	424202	1.9	61.2	72.4	72.9	77.1	78.1	68.2	71.6
39	379219	4.4	56.2	80.6	77.1	75.8	75.9	70.8	72.7
40	982094	2.8	54.3	81.7	84.1	79.9	80.6	75.2	76.0
41	765932	2.6	47.8	85.2	81.5	80.4	81.2	73.6	74.9
42	443688	3.9	52.3	80.8	79.6	77.6	78.3	72.6	73.5
43	1174589	3.9	54.0	80.6	78.7	76.7	77.1	71.7	73.2
44	268623	4.3	47.9	82.3	79.2	75.7	76.6	72.5	72.4
45	337926	4.2	56.7	79.4	78.0	76.1	76.7	71.7	73.1
46	317218	10.1	50.7	75.1	72.3	69.8	69.0	65.1	67.0
153	92303	2.0	61.8	71.3	72.8	75.9	74.9	66.9	70.6

POPULATION ITEM	TOTALS	PROMPT	15 DEC 51	25 DEC 51	15 MAY 51	15 JUN 51	5 JUL 52	25 NOV 50	SIX WIND AVERAGE
REGION -N.EAST				ATTACK 130		INTEGRATED DOSE INTERVAL=0-2999			
1	163593	1.2	85.3	95.6	93.9	91.2	92.5	67.5	87.7
3	446779	2.1	37.1	96.1	91.7	83.8	85.4	71.9	77.7
6	357939	2.0	29.6	96.4	92.4	83.8	85.2	74.1	76.9
7	91118	1.4	76.9	94.2	93.1	90.1	90.6	54.1	83.2
10	465707	2.2	38.4	95.9	91.5	83.3	85.1	70.9	77.5
12	449988	2.0	39.0	95.8	91.0	82.6	84.1	71.7	77.4
24	204904	1.8	27.5	97.0	93.9	85.8	87.2	75.6	77.9
25	93456	1.9	32.2	96.5	92.6	84.5	86.1	73.9	77.6
74	384765	1.0	20.3	98.0	96.2	87.9	89.6	82.5	79.1
94	452781	1.7	36.1	96.6	92.8	85.0	86.1	71.2	78.0
135	56329	1.2	85.4	95.1	94.8	91.4	92.2	58.3	86.2
148	229209	2.1	68.2	93.4	89.8	86.9	88.6	55.4	80.4
149	66431	3.2	57.4	90.7	88.0	86.4	87.9	54.8	77.5
150	96556	1.1	82.0	95.6	94.2	89.7	90.6	57.1	84.9
151	40137	2.8	55.0	91.6	80.3	79.5	84.4	59.2	75.0
152	26105	1.4	64.7	95.4	92.6	89.5	88.9	45.0	79.4
159	164942	2.3	65.2	92.1	90.5	90.0	90.6	50.4	79.8
37	170972	1.9	34.9	96.3	92.0	83.8	85.3	72.1	77.4
38	34351	2.0	67.3	93.8	90.8	87.1	88.4	57.9	80.9
39	87191	2.1	36.4	96.1	91.0	83.2	85.1	72.0	77.3
40	305811	1.9	44.3	95.8	91.4	83.2	85.1	70.1	78.3
41	265616	2.0	30.7	96.7	90.3	82.6	83.3	68.0	75.3
42	118945	1.6	32.1	96.8	94.0	86.9	88.1	75.7	79.0
43	297900	1.9	33.6	96.2	92.2	84.1	85.5	73.2	77.5
44	86053	1.8	24.0	97.1	93.9	84.9	86.8	79.1	77.6
45	82973	2.2	39.6	96.2	91.7	80.9	83.5	70.6	77.1
46	77800	2.6	30.6	96.1	90.9	81.6	83.6	71.4	75.7
153	5010	1.0	82.1	95.1	94.9	91.2	91.7	56.3	85.2

REGION -S.EAST ATTACK 130 INTEGRATED DOSE INTERVAL=0-2999

POPULATION ITEM	TOTALS	PROMPT	15 DEC 51	25 DEC 51	15 MAY 51	15 JUN 51	5 JUL 52	25 NOV 50	SIX WIND AVERAGE
1	447603	0.9	66.5	85.4	79.6	87.0	88.5	72.4	79.9
3	380213	7.6	56.4	77.1	73.8	76.9	75.1	68.6	71.3
6	206811	12.2	54.1	72.4	71.1	70.6	67.1	62.9	66.4
7	440215	0.8	57.9	81.2	74.8	83.2	88.0	71.3	76.1
10	439169	7.9	57.2	77.1	73.3	75.7	74.5	67.0	70.8
12	315169	6.0	57.1	77.7	74.9	79.5	75.9	71.4	72.7
24	93789	15.3	47.2	66.5	65.9	65.4	62.6	59.4	61.2
25	55109	10.9	52.2	72.7	70.8	72.5	69.6	65.9	67.3
74	152237	11.2	51.3	73.1	72.6	73.6	70.7	64.8	67.7
94	195435	3.9	46.1	78.0	80.3	79.1	77.6	72.1	72.2
135	236925	0.6	63.9	82.3	78.9	84.9	88.4	70.6	78.2
148	528412	0.8	64.1	78.1	75.9	81.4	84.3	69.2	75.5
149	293619	0.9	70.3	75.7	72.6	80.6	85.1	66.1	75.1
150	53851	1.3	49.0	81.0	74.8	79.4	78.3	72.6	72.5
151	71310	0.3	67.3	86.8	85.4	80.5	79.8	71.9	78.6
152	103448	0.7	56.2	76.0	77.8	84.3	87.3	72.7	75.7
159	778310	0.8	71.6	83.4	72.6	84.1	84.2	66.9	77.1
37	128971	8.1	55.6	76.9	73.5	76.3	74.5	68.3	70.8
38	120665	1.0	63.3	80.5	73.8	82.1	85.7	68.8	75.7
39	87450	7.8	57.8	77.8	72.7	77.4	73.9	70.0	71.6
40	122760	5.1	50.9	77.4	79.9	77.0	76.0	69.0	71.7
41	183746	3.4	55.1	84.8	79.6	84.6	83.2	77.6	77.5
42	81201	8.8	53.6	74.4	74.9	74.5	71.9	67.5	69.5
43	227604	7.9	57.1	77.0	73.4	76.2	73.3	68.4	70.9
44	45079	10.5	56.2	75.2	69.9	72.9	68.7	66.1	68.2
45	66285	8.5	56.0	76.4	72.2	76.3	75.4	68.0	70.7
46	77608	28.0	43.4	56.0	53.4	53.1	51.1	47.6	50.8
153	13755	0.6	59.2	80.8	81.7	84.0	87.9	71.3	77.5

REGION -E.N.C. ATTACK 130 INTEGRATED DOSE INTERVAL=0-2999

POPULATION ITEM	TOTALS	PROMPT	15 DEC 51	25 DEC 51	15 MAY 51	15 JUN 51	5 JUL 52	25 NOV 50	SIX WIND AVERAGE
1	244811	0.1	62.7	69.2	83.9	87.8	95.4	99.9	83.2
3	362252	0.0	59.1	74.6	93.6	97.4	99.1	99.7	87.3
6	264368	0.	57.9	75.7	95.5	98.4	99.4	99.7	87.8
7	256227	0.1	57.4	65.5	82.5	91.9	98.0	99.9	82.5
10	424715	0.0	59.6	74.8	93.6	97.4	99.1	99.6	87.3
12	336007	0.0	58.5	73.1	92.6	97.0	99.1	99.9	86.7
24	157831	0.	55.7	76.5	95.6	98.6	99.5	99.7	87.6
25	71985	0.0	57.6	75.1	94.6	98.0	99.3	99.7	87.4
74	215192	0.0	52.3	75.7	95.4	98.6	99.7	100.0	86.9
94	407382	0.	56.7	76.1	95.8	98.7	99.9	100.0	87.9
135	161541	0.1	58.1	63.6	81.1	91.4	97.7	99.9	82.0
148	520343	0.1	59.2	61.2	80.9	92.2	98.5	99.9	82.0
149	191030	0.0	65.0	58.3	88.2	96.5	99.6	100.0	84.6
150	106538	0.1	45.7	63.0	69.0	84.4	95.9	99.9	76.3
151	26556	0.0	54.9	64.3	85.7	92.5	96.8	100.0	82.4
152	196279	0.1	61.4	62.8	79.6	92.3	99.1	99.9	82.5
159	423744	0.0	64.4	61.2	87.8	95.1	99.2	100.0	84.6
37	132985	0.0	58.0	74.4	93.7	97.6	99.2	99.8	87.1
38	67174	0.1	56.3	63.7	79.7	90.8	97.8	99.9	81.4
39	65183	0.0	58.2	74.7	93.2	97.6	99.1	99.8	87.1
40	325222	0.	60.9	74.6	95.9	98.5	99.4	99.5	88.1
41	141252	0.	52.9	75.6	93.2	97.3	99.4	99.9	86.4
42	88648	0.0	54.7	74.9	94.9	97.7	99.3	99.8	86.9
43	235700	0.0	57.9	74.4	93.7	97.6	99.3	99.8	87.1
44	48377	0.	54.5	75.8	95.2	98.2	99.5	99.8	87.2
45	66371	0.0	62.9	72.9	92.9	97.6	99.1	99.9	87.5
46	50521	0.0	60.7	74.9	94.4	98.0	99.2	99.8	87.8
153	13672	0.1	52.7	64.0	74.9	88.2	97.2	99.9	79.5

REGION -W.N.C. ATTACK 130 INTEGRATED DOSE INTERVAL=0-2999

POPULATION ITEM	TOTALS	PROMPT	15 DEC 51	25 DEC 51	15 MAY 51	15 JUN 51	5 JUL 52	25 NOV 50	SIX WIND AVERAGE
1	509674	5.4	39.2	45.3	54.9	55.8	47.7	48.5	48.6
3	153950	3.6	31.8	42.6	38.4	66.4	56.9	58.2	49.1
6	90463	3.2	30.3	40.0	30.1	67.5	58.5	61.9	48.1
7	282916	3.6	34.8	46.1	52.8	66.8	55.4	51.0	51.1
10	175861	3.7	31.4	41.0	37.4	66.6	56.2	58.8	48.6
12	172061	3.5	32.4	45.4	40.8	66.7	58.1	57.6	50.2
24	44979	3.2	30.6	36.6	30.5	70.1	58.9	62.3	48.1
25	25952	3.4	31.5	40.5	34.3	67.6	57.9	59.9	48.6
74	92623	3.2	32.4	46.4	32.2	65.5	60.7	57.6	49.1
94	86723	2.4	28.8	44.6	23.6	69.5	64.1	67.2	49.6
135	440663	5.8	37.0	46.4	53.8	57.8	49.4	45.3	48.3
148	779900	3.6	39.0	45.3	51.4	69.4	60.3	47.6	52.2
149	247491	5.5	34.7	42.3	49.1	67.6	62.4	45.4	50.3
150	64587	2.6	25.4	46.0	58.3	68.4	49.0	59.6	51.1
151	32569	1.9	33.0	47.6	57.8	74.9	55.8	52.9	53.7
152	435310	2.8	43.9	46.8	51.2	70.1	61.1	46.6	53.3
159	263030	4.4	29.2	43.6	47.7	72.1	62.6	53.0	51.4
37	55582	3.4	31.9	42.5	37.6	66.9	57.7	58.6	49.2
38	89565	3.6	35.2	45.5	52.9	67.5	56.0	50.3	51.2
39	31439	3.9	30.8	41.0	38.1	65.6	56.3	57.5	48.2
40	51123	2.7	27.9	36.8	23.8	71.6	60.4	69.6	48.4
41	52455	3.1	29.4	45.1	33.0	68.8	62.5	63.1	50.3
42	41699	3.8	32.0	42.8	33.9	63.3	57.9	56.6	47.8
43	108469	3.3	32.5	42.3	37.7	66.5	56.9	57.3	48.9
44	21644	3.4	31.6	37.4	30.9	67.6	58.2	59.9	47.6
45	32497	3.2	33.1	39.4	39.6	69.3	55.7	60.1	49.5
46	23281	3.6	31.7	43.2	34.9	64.3	56.0	58.5	48.1
153	28376	3.5	37.8	47.7	55.4	65.0	54.4	47.8	51.3

REGION -S.CEN. ATTACK 130 INTEGRATED DOSE INTERVAL=0-2999

POPULATION ITEM	TOTALS	PROMPT	15 DEC 51	25 DEC 51	15 MAY 51	15 JUN 51	5 JUL 52	25 NOV 50	SIX WIND AVERAGE
1	429332	1.2	90.6	91.4	86.8	73.2	75.0	64.9	80.3
3	169520	5.1	86.8	89.3	76.2	65.3	73.6	53.4	74.1
6	114777	6.4	87.8	89.9	74.2	66.4	74.9	54.1	74.5
7	151832	1.8	80.4	85.9	82.1	61.2	73.8	52.0	72.6
10	202207	5.4	87.0	88.9	77.1	65.9	75.1	54.6	74.8
12	142979	4.2	85.8	89.6	75.3	63.9	70.3	50.5	72.6
24	44549	5.6	87.6	91.1	72.4	65.1	75.0	52.7	74.0
25	25601	5.4	87.3	90.4	73.8	65.3	73.7	53.0	73.9
74	98472	5.4	86.4	91.3	70.8	62.7	73.5	51.4	72.7
94	71366	5.7	87.9	91.6	68.4	67.6	75.2	49.4	73.3
135	321592	1.0	91.6	92.6	89.3	76.9	77.5	70.0	83.0
148	365893	1.4	83.7	86.6	86.7	66.9	76.3	62.1	77.1
149	205064	1.1	81.4	82.3	88.4	62.9	80.2	61.5	76.1
150	20712	2.8	84.2	92.7	79.9	71.3	68.4	56.1	75.4
151	22774	2.7	68.7	89.4	81.6	70.6	62.1	64.1	72.7
152	117907	1.5	90.7	92.4	86.1	72.6	73.7	64.0	79.9
159	133425	1.4	79.7	82.6	87.4	62.0	73.9	53.9	73.2
37	56573	4.9	87.1	90.1	75.2	65.4	73.7	53.2	74.1
38	53441	1.6	83.4	86.9	84.1	66.2	77.6	57.4	75.9
39	42628	4.7	88.3	90.7	76.2	66.1	75.1	54.4	75.1
40	41752	6.1	84.4	89.5	62.2	58.4	63.9	41.4	66.6
41	49790	4.5	87.3	90.4	74.4	68.4	76.4	53.0	75.0
42	42478	5.6	87.3	90.2	74.2	66.0	73.7	51.2	73.8
43	117375	5.2	87.5	90.2	74.9	65.6	74.3	53.8	74.4
44	21910	5.6	88.1	91.3	69.5	61.7	74.6	49.2	72.4
45	32287	4.8	87.9	89.8	77.8	64.3	74.3	54.9	74.8
46	28182	6.8	88.4	89.5	77.4	67.1	71.3	57.3	75.2
153	14690	1.4	89.9	93.1	85.4	71.6	74.6	58.7	78.9

REGION -MOUNT. ATTACK 130 INTEGRATED DOSE INTERVAL=0-2999

POPULATION ITEM	TOTALS	PROMPT	15 DEC 51	25 DEC 51	15 MAY 51	15 JUN 51	5 JUL 52	25 NOV 50	SIX WIND AVERAGE
1	856956	2.1	88.6	84.8	84.2	84.1	82.2	84.5	84.8
3	68547	3.2	87.7	84.5	68.5	75.6	72.7	80.1	78.2
6	46012	3.3	87.1	84.4	62.6	73.4	70.3	77.9	75.9
7	57070	2.9	88.0	85.4	82.3	81.9	78.0	84.7	83.4
10	87708	3.1	88.1	84.4	69.1	75.8	72.9	79.9	78.4
12	52764	3.3	87.2	85.8	68.7	77.3	74.6	80.4	79.0
24	23418	3.2	87.9	85.6	62.1	73.1	71.0	78.5	76.3
25	12139	3.3	87.5	84.9	65.1	74.3	72.0	79.2	77.2
74	35254	3.4	86.5	85.8	63.1	75.1	73.7	77.3	76.9
94	20764	4.2	89.2	89.6	59.6	78.6	77.1	78.8	78.8
135	413186	3.6	82.4	79.9	77.8	77.6	77.0	79.1	79.0
148	235616	3.4	85.1	80.5	77.6	76.8	67.8	80.4	78.0
149	98287	3.7	83.6	73.5	80.1	73.3	59.4	80.4	75.1
150	15279	1.7	95.1	94.2	82.7	88.2	78.0	90.9	88.2
151	4670	3.1	89.9	85.8	83.3	81.4	78.0	78.3	82.8
152	117207	3.4	84.7	84.4	74.6	78.1	73.1	79.2	79.0
159	50553	2.9	83.8	74.8	86.1	74.9	62.9	81.4	77.3
37	23309	3.0	88.0	85.3	67.7	75.8	73.3	80.0	78.3
38	22353	3.1	86.5	82.9	80.9	79.2	69.9	83.1	80.4
39	18373	3.4	87.3	85.2	66.9	74.0	69.6	79.9	77.2
40	16743	2.1	91.4	90.1	67.8	78.4	74.8	82.3	80.8
41	12782	2.2	90.7	90.0	61.9	82.4	80.0	81.6	81.1
42	18568	2.9	87.9	86.6	67.8	75.0	76.9	79.4	78.9
43	46771	3.0	87.3	85.4	66.8	75.7	73.5	79.1	78.0
44	9534	3.4	87.0	86.3	59.9	75.1	69.4	77.3	75.8
45	15536	3.5	87.5	84.1	69.1	77.2	73.6	80.1	78.6
46	16077	3.5	88.2	83.6	64.6	74.7	74.5	77.4	77.2
153	10596	3.6	83.3	82.6	77.2	78.3	76.1	79.0	79.4

REGION -N.WEST ATTACK 130 INTEGRATED DOSE INTERVAL=0-2999

POPULATION ITEM	TOTALS	PROMPT	15 DEC 51	25 DEC 51	15 MAY 51	15 JUN 51	5 JUL 52	25 NOV 50	SIX WIND AVERAGE
1	162957	0.7	99.3	99.3	94.7	99.3	96.1	99.3	98.0
3	46222	2.0	98.0	98.0	97.0	98.0	97.5	98.0	97.8
6	30440	1.9	98.1	98.1	97.4	98.1	98.0	98.1	98.0
7	30091	1.2	98.8	98.8	95.9	98.8	97.0	98.8	98.0
10	50088	2.1	97.9	97.9	96.9	97.9	97.4	97.9	97.6
12	46262	1.7	98.3	98.3	97.2	98.3	97.7	98.3	98.0
24	18408	2.0	98.0	98.0	97.2	98.0	97.8	98.0	97.9
25	9248	1.9	98.1	98.1	97.1	98.1	97.7	98.1	97.9
74	24168	1.3	98.7	98.7	97.7	98.7	98.2	98.7	98.5
94	32311	1.2	98.8	98.8	98.0	98.8	98.5	98.8	98.6
135	62429	0.7	99.3	99.3	91.4	99.3	94.2	99.3	97.1
148	98111	1.0	99.0	99.0	92.6	99.0	97.4	99.0	97.7
149	57546	0.8	99.2	99.2	92.7	99.2	97.3	99.2	97.8
150	11300	1.8	98.1	98.1	96.0	98.1	97.8	98.1	97.7
151	5946	2.0	98.0	98.0	95.7	98.0	97.9	98.0	97.6
152	23327	0.6	99.4	99.4	89.9	99.4	97.1	99.4	97.4
159	36570	0.8	99.2	99.2	95.4	99.2	98.5	99.2	98.5
37	16370	1.8	98.2	98.2	97.2	98.2	97.7	98.2	98.0
38	10772	1.1	98.9	98.9	95.2	98.9	96.7	98.9	97.9
39	10784	1.9	98.1	98.1	97.0	98.1	97.7	98.1	97.9
40	27160	2.0	98.0	98.0	97.4	98.0	97.5	98.0	97.8
41	12484	1.5	98.4	98.4	97.4	98.4	98.3	98.4	98.2
42	12767	1.7	98.3	98.3	97.2	98.3	97.9	98.3	98.1
43	32594	1.8	98.2	98.2	97.2	98.2	97.8	98.2	98.0
44	6889	1.8	98.2	98.2	97.6	98.2	98.0	98.2	98.1
45	10321	1.7	98.3	98.3	97.2	98.3	97.7	98.3	98.0
46	8344	2.2	97.7	97.7	96.2	97.7	97.3	97.7	97.4
153	2504	0.8	99.2	99.2	92.7	99.2	96.3	99.2	97.6

A.M. 5-40

U. S. TOTALS ATTACK 230 INTEGRATED DOSE INTERVAL=0-999

POPULATION ITEM	TOTALS	PROMPT	15 DEC 51	25 DEC 51	15 MAY 51	15 JUN 51	5 JUL 52	25 NOV 50	SIX WIND AVERAGE
1	2971499	1.8	42.6	40.9	49.2	51.9	49.8	46.6	45.9
3	1784656	24.6	14.5	14.1	20.7	19.7	22.2	20.0	18.5
6	1246326	32.8	11.4	10.6	15.7	14.3	16.4	15.7	14.0
7	1343059	1.8	28.2	27.5	36.8	38.8	42.1	34.7	34.7
10	2019872	24.2	14.4	14.4	20.7	19.6	22.3	19.9	18.5
12	1653024	24.0	16.3	15.0	21.5	21.3	23.4	21.4	19.8
24	675084	30.6	11.0	10.0	13.8	13.5	15.3	15.1	13.1
25	329959	28.4	13.0	12.0	17.3	16.7	18.7	17.7	15.9
74	**1103668**	**41.5**	**11.9**	**9.9**	**15.8**	**14.5**	**16.1**	**15.2**	**13.9**
94	1387922	30.6	8.7	8.2	14.5	15.3	16.8	14.9	13.0
135	1750307	1.5	45.0	43.5	48.9	52.7	50.7	47.2	48.0
148	3039695	2.8	37.3	33.5	33.8	40.8	43.4	37.7	37.8
149	1331375	3.3	35.5	31.6	31.1	38.6	42.6	36.8	36.0
150	401179	3.3	29.6	28.5	28.4	32.3	38.6	31.5	31.5
151	225141	3.3	23.3	20.6	32.0	33.8	36.4	28.0	29.0
152	1076563	1.9	45.5	40.7	39.6	48.5	47.9	43.4	44.3
159	1961169	2.5	24.5	23.3	29.2	34.3	38.2	28.7	29.7
37	642352	26.0	14.0	13.4	19.6	19.1	21.4	19.2	17.8
38	424202	3.1	30.7	29.8	34.8	38.1	41.2	34.6	34.9
39	379219	23.5	15.4	15.4	21.4	20.2	22.3	20.9	19.3
40	982094	25.7	9.3	8.6	15.0	16.0	18.0	16.5	13.9
41	765932	25.3	9.8	10.8	18.3	18.9	21.1	17.2	16.0
42	443688	28.4	13.6	13.1	19.5	17.0	19.8	18.6	16.9
43	1174589	27.2	14.8	13.9	19.8	18.7	21.1	19.3	18.0
44	268623	34.3	11.8	10.2	14.9	14.0	15.6	15.2	13.6
45	337926	23.4	15.9	14.7	21.7	21.3	24.1	20.9	19.7
46	317218	34.7	12.6	12.0	15.7	15.0	16.6	15.6	14.6
153	92303	1.7	40.7	38.7	41.7	44.6	47.9	41.7	42.6

REGION -N.EAST ATTACK 230 INTEGRATED DOSE INTERVAL=0-999

POPULATION ITEM	TOTALS	PROMPT	15 DEC 51	25 DEC 51	15 MAY 51	15 JUN 51	5 JUL 52	25 NOV 50	SIX WIND AVERAGE
1	163593	3.8	0.	5.5	26.2	28.3	24.1	13.9	16.3
3	446779	29.3	0.	0.3	6.0	10.4	10.3	7.2	5.7
6	357939	34.6	0.	0.2	4.0	7.2	6.9	5.5	4.0
7	91118	3.7	0.	2.2	16.5	27.8	27.5	9.7	14.0
10	465707	27.9	0.	0.3	6.0	10.5	10.2	7.7	5.8
12	449968	30.0	0.	0.3	6.4	11.0	11.1	7.3	6.0
24	204904	30.0	0.	0.3	3.3	7.2	6.9	5.2	3.8
25	93456	30.7	0.	0.3	4.7	8.8	8.5	6.1	4.7
74	**384765**	**57.1**	**0.**	**0.1**	**2.8**	**4.7**	**4.8**	**3.2**	**2.6**
94	452761	34.0	0.	0.3	4.8	10.3	9.1	5.8	5.1
135	56329	3.2	0.	3.0	19.3	28.2	26.3	10.3	14.5
148	229209	4.9	0.	3.2	14.6	21.8	21.4	8.7	11.6
149	66431	7.4	0.	7.4	15.3	21.3	17.1	9.4	11.8
150	96556	3.4	0.	2.0	14.7	23.5	25.1	6.7	12.0
151	40137	5.3	0.	0.8	13.7	17.1	18.2	12.6	10.4
152	26105	3.8	0.	1.2	14.4	24.1	23.9	7.9	11.9
159	164942	5.1	0.	7.5	19.3	25.7	23.5	10.0	14.3
37	170972	30.5	0.	0.3	5.6	9.8	9.6	6.4	5.3
38	34351	6.4	0.	2.4	13.5	22.3	22.0	8.9	11.5
39	87191	26.4	0.	0.4	5.7	9.7	10.1	7.8	5.6
40	305811	25.3	0.	0.5	5.9	13.0	11.2	8.4	6.5
41	265616	31.3	0.	0.1	7.1	9.4	9.5	4.3	5.1
42	118945	32.2	0.	0.2	5.0	9.4	9.2	7.1	5.1
43	297900	31.7	0.	0.2	5.2	9.0	9.0	6.2	4.9
44	86053	37.5	0.	0.2	3.0	5.4	5.0	4.0	2.9
45	82973	27.5	0.	0.3	5.9	11.3	11.2	7.1	6.0
46	77600	33.2	0.	0.2	4.4	6.5	7.0	4.7	3.8
153	5010	3.1	0.	1.9	15.8	26.3	26.3	8.5	13.1

REGION -S.EAST ATTACK 230 INTEGRATED DOSE INTERVAL=0-999

POPULATION ITEM	TOTALS	PROMPT	15 DEC 51	25 DEC 51	15 MAY 51	15 JUN 51	5 JUL 52	25 NOV 50	SIX WIND AVERAGE
1	447603	2.4	11.6	20.1	34.5	32.0	36.0	24.7	26.5
3	380213	19.7	11.3	17.1	28.4	24.4	23.2	24.3	21.5
6	206811	31.3	13.6	15.8	23.8	20.3	16.8	22.6	18.8
7	440215	1.8	6.0	17.0	37.4	32.9	32.8	25.2	25.2
10	439169	20.6	10.0	16.1	26.7	23.2	22.1	22.4	20.1
12	315169	16.7	16.5	20.8	31.8	27.7	24.2	28.1	24.9
24	93769	32.4	11.9	14.9	21.7	17.4	15.0	20.5	16.9
25	55109	25.7	12.9	16.9	25.9	21.7	19.5	23.9	20.1
74	152237	31.2	13.8	15.9	25.3	20.2	17.5	23.6	19.4
94	195435	21.6	6.4	17.2	24.2	26.0	24.7	25.0	20.6
135	230925	1.7	11.1	19.1	34.8	31.9	34.9	24.0	26.0
148	528412	2.6	13.2	16.4	30.2	30.0	31.0	22.7	23.9
149	293619	2.9	14.7	16.7	25.5	30.7	31.9	19.9	23.2
150	53651	3.7	15.2	22.5	34.2	28.0	27.6	31.9	26.6
151	71310	1.8	7.8	9.6	37.9	33.5	33.9	25.9	24.8
152	103448	1.9	12.2	18.2	38.3	28.6	30.0	25.0	25.4
159	776310	2.6	12.1	16.0	24.8	30.6	33.5	20.3	22.9
37	128971	21.1	11.8	17.0	27.6	24.9	23.6	24.7	21.6
38	120665	2.6	10.4	17.7	33.4	33.1	31.1	24.2	25.0
39	87450	20.3	15.2	19.1	29.1	26.7	23.0	26.3	23.2
40	122760	17.4	7.8	16.5	29.8	24.5	23.9	25.0	21.2
41	163746	14.2	8.9	18.3	29.0	32.8	34.6	29.4	25.5
42	81201	26.1	12.5	16.2	27.1	19.9	18.6	24.2	19.7
43	227604	23.2	13.8	17.6	27.3	23.6	21.4	24.7	21.4
44	45079	30.6	15.8	16.5	23.3	21.0	17.1	23.4	19.5
45	66285	20.5	11.0	17.1	28.0	25.2	25.2	24.2	21.8
46	77608	42.1	7.6	11.5	16.4	13.3	12.1	13.6	12.4
153	13755	1.8	13.2	21.0	39.7	30.5	32.1	26.8	27.2

REGION -E.N.C. ATTACK 230 INTEGRATED DOSE INTERVAL=0-999

POPULATION ITEM	TOTALS	PROMPT	15 DEC 51	25 DEC 51	15 MAY 51	15 JUN 51	5 JUL 52	25 NOV 50	SIX WIND AVERAGE
1	244611	1.5	36.9	21.5	30.0	33.4	37.1	32.5	31.9
3	362252	20.5	13.3	8.3	16.0	15.7	20.7	17.8	15.3
6	204366	26.9	9.8	6.6	11.6	11.7	17.0	13.7	11.7
7	256227	1.1	27.8	16.4	30.3	31.9	35.2	33.7	29.2
10	424715	20.0	13.3	8.3	15.3	15.9	21.2	17.7	15.3
12	336007	20.0	15.0	9.2	18.2	17.0	21.5	19.8	16.8
24	157631	24.6	9.5	7.1	11.1	10.9	16.4	13.2	11.4
25	71965	22.7	11.5	7.6	13.8	13.5	18.6	15.8	13.5
74	215192	30.7	9.0	5.7	10.9	10.5	14.2	13.0	10.5
94	407362	25.1	10.2	5.3	13.5	12.4	16.6	15.9	12.3
135	161541	1.1	28.8	17.6	31.5	30.8	35.2	31.5	29.2
148	520343	1.4	30.4	19.4	31.1	28.8	34.5	30.3	29.1
149	191030	1.9	25.7	11.5	25.9	25.7	31.3	25.4	24.2
150	106538	0.8	38.4	26.8	26.9	34.8	42.2	41.0	35.0
151	26556	0.9	22.7	12.8	29.5	33.7	31.4	37.7	28.0
152	156279	1.2	31.7	24.0	38.6	27.8	33.9	28.3	30.7
159	423744	1.2	24.9	11.5	29.7	27.8	30.5	30.5	25.8
37	132965	21.4	12.9	8.2	15.3	15.1	20.1	17.5	14.8
38	67174	1.8	29.1	18.3	29.6	30.2	35.1	32.8	29.2
39	65183	18.7	13.7	9.2	16.0	16.2	21.7	17.7	15.8
40	325222	22.5	10.6	6.0	14.2	13.5	19.5	16.9	13.5
41	141252	21.1	13.5	8.4	14.2	14.3	17.7	18.7	14.5
42	88646	21.9	11.4	8.1	14.1	13.1	18.5	15.5	13.4
43	235700	22.1	12.9	8.2	15.3	15.1	20.0	17.0	14.7
44	46377	26.4	9.8	7.0	11.5	12.3	17.4	13.1	11.9
45	66371	17.9	14.7	9.4	19.4	17.4	22.3	17.8	16.8
46	50521	25.8	11.4	7.7	12.2	14.2	17.2	14.4	12.9
153	13672	0.9	33.3	23.7	32.7	30.9	38.4	33.9	32.2

REGION -W.N.C. ATTACK 230 INTEGRATED DOSE INTERVAL=0-999

POPULATION ITEM	TOTALS	PROMPT	15 DEC 51	25 DEC 51	15 MAY 51	15 JUN 51	5 JUL 52	25 NOV 50	SIX WIND AVERAGE
1	509674	0.6	69.4	59.3	53.8	66.5	66.3	57.7	62.1
3	153950	25.9	45.1	39.1	30.1	39.3	41.9	33.7	38.2
6	90463	41.6	33.6	29.7	20.5	28.0	30.7	23.2	27.6
7	282916	0.7	64.5	55.1	44.3	59.9	60.8	50.8	55.9
10	175861	26.5	45.0	39.4	29.3	38.7	41.5	33.8	37.9
12	172061	23.7	45.7	39.6	32.2	40.8	43.6	34.7	39.4
24	44979	37.9	36.3	31.1	20.4	29.8	31.6	24.0	28.9
25	25952	32.3	40.4	35.0	25.5	34.6	36.8	28.8	33.5
74	92623	39.5	37.4	32.0	24.9	34.9	35.9	28.2	32.2
94	66723	46.9	30.1	25.8	17.0	26.8	29.0	18.4	24.5
135	440663	0.5	68.9	60.5	54.2	68.3	67.3	56.7	62.6
148	779900	0.8	67.5	55.4	40.5	65.7	63.4	53.2	57.6
149	247491	0.9	67.9	53.7	38.9	69.0	63.5	54.9	58.0
150	64587	0.7	67.4	62.7	42.8	49.9	63.9	48.2	55.8
151	32569	0.5	67.3	57.9	43.0	63.4	60.8	47.7	56.7
152	435310	0.8	67.4	55.2	40.8	66.4	63.5	53.4	57.8
159	263030	0.8	57.9	53.6	39.4	60.2	59.0	44.7	52.5
37	55582	28.0	43.7	38.0	29.1	38.5	40.8	32.3	37.1
38	69565	0.8	65.1	56.1	44.7	61.5	62.3	51.9	56.9
39	31439	25.6	44.1	39.0	29.1	38.3	40.6	33.2	37.4
40	51123	38.4	33.6	32.3	19.7	29.6	31.3	23.2	28.3
41	52455	36.6	33.2	30.3	22.6	29.9	31.7	22.3	28.3
42	41699	35.8	37.1	32.2	24.7	31.2	33.7	27.1	31.0
43	108469	29.2	43.3	37.4	28.1	37.8	40.3	31.9	36.5
44	21644	43.3	32.9	29.1	19.7	27.2	29.4	22.6	26.8
45	32497	23.3	48.7	38.8	31.9	42.6	43.3	34.5	40.0
46	23261	34.6	38.4	34.7	25.9	34.1	36.7	29.7	33.3
153	28376	0.6	67.2	58.3	48.5	63.6	64.5	53.7	59.3

REGION -S.CEN. ATTACK 230 INTEGRATED DOSE INTERVAL=0-999

POPULATION ITEM	TOTALS	PROMPT	15 DEC 51	25 DEC 51	15 MAY 51	15 JUN 51	5 JUL 52	25 NOV 50	SIX WIND AVERAGE
1	429332	1.9	28.3	34.2	48.7	41.9	44.1	32.7	38.3
3	169520	17.5	15.0	19.5	42.0	18.6	33.9	19.0	24.7
6	114777	24.0	12.8	19.9	43.0	15.5	29.2	16.3	22.8
7	151832	2.2	24.1	16.6	37.9	28.6	45.9	30.3	30.6
10	202207	18.6	15.3	20.5	44.5	18.6	34.4	19.2	25.4
12	142979	14.4	15.0	18.7	36.6	19.1	34.8	20.1	24.0
24	44549	23.1	12.2	17.0	43.3	15.0	27.3	15.7	21.7
25	25801	20.8	13.1	18.0	41.5	16.4	29.5	16.9	22.6
74	96472	24.0	12.8	16.3	40.3	14.7	25.9	16.2	21.0
94	71366	21.5	8.5	14.7	48.1	15.3	25.2	11.0	20.5
135	321592	1.9	32.4	38.6	50.8	45.7	40.9	36.3	40.8
148	365693	2.6	31.0	23.0	42.5	34.9	41.8	36.4	34.9
149	205064	2.6	32.9	20.5	46.0	35.6	45.0	41.8	37.0
150	20712	4.5	19.4	15.9	33.3	19.6	39.8	22.8	25.2
151	22774	1.7	30.5	10.9	44.3	36.4	55.8	13.4	31.9
152	117907	3.1	29.6	31.2	37.5	36.5	33.8	34.0	33.8
159	133425	2.0	27.1	14.2	42.9	29.7	49.1	33.2	32.7
37	56573	18.6	14.3	19.0	41.7	17.9	32.3	18.4	24.0
38	53441	2.8	27.4	23.0	42.9	30.9	45.1	33.3	33.8
39	42628	17.8	13.7	18.5	42.2	16.8	32.6	17.5	23.5
40	41752	21.5	10.6	13.1	35.2	14.3	25.8	14.1	19.0
41	49790	17.0	12.8	17.6	46.5	20.4	33.2	15.7	24.3
42	42478	19.6	12.9	22.1	44.7	15.2	31.7	16.1	23.8
43	117375	20.0	14.5	19.5	41.7	17.2	31.3	18.5	23.8
44	21910	26.0	10.5	17.1	39.1	11.6	25.6	14.1	19.7
45	32287	16.5	13.9	18.2	41.3	17.7	35.1	19.0	24.2
46	28182	30.0	11.4	17.6	31.8	12.6	26.0	14.9	19.1
153	14690	2.4	23.7	24.6	37.2	30.3	40.1	29.0	30.9

REGION -MOUNT. ATTACK 230 INTEGRATED DOSE INTERVAL=0-999

POPULATION ITEM	TOTALS	PROMPT	15 DEC 51	25 DEC 51	15 MAY 51	15 JUN 51	5 JUL 52	25 NOV 50	SIX WIND AVERAGE
1	656556	0.9	56.9	49.0	69.0	69.9	56.8	64.1	61.0
3	66547	22.5	33.9	30.2	34.3	30.6	32.2	36.9	33.0
6	46012	31.7	26.0	22.8	23.8	19.5	23.6	26.7	23.7
7	57070	1.7	49.5	48.4	62.7	56.9	56.1	63.0	56.1
10	87708	21.7	34.8	30.0	34.3	31.3	32.2	36.3	33.2
12	52764	24.1	34.1	31.9	37.1	31.9	34.0	39.4	34.7
24	23416	28.6	30.0	25.4	26.4	24.0	24.9	30.1	26.8
25	12139	26.1	31.3	27.4	30.4	26.6	28.6	33.1	29.6
74	35254	34.9	26.4	25.9	30.0	24.6	27.4	30.0	27.4
94	20764	33.9	24.0	18.2	17.1	14.7	23.0	23.5	20.1
135	415186	1.1	59.7	52.1	66.4	68.1	59.8	66.7	62.1
148	235616	2.2	44.1	39.4	53.1	51.1	48.0	58.8	49.1
149	98287	2.4	40.6	32.7	50.6	45.4	45.8	53.7	44.8
150	15279	3.4	33.9	44.4	53.2	41.4	46.5	55.1	45.8
151	4670	4.6	43.6	39.1	51.1	42.4	46.5	50.7	45.6
152	117207	1.8	48.4	44.4	55.2	57.4	50.1	63.8	53.2
159	50553	2.4	32.5	36.2	50.5	39.1	45.4	52.3	42.7
37	23309	24.1	32.4	29.4	33.5	28.8	31.2	35.6	31.8
38	22353	3.0	45.1	42.8	55.9	49.5	50.2	58.0	50.2
39	18373	22.1	32.7	30.0	32.0	30.6	30.5	35.9	31.9
40	16743	26.7	24.5	17.9	20.6	16.8	22.0	25.5	21.2
41	12782	33.3	26.2	25.9	29.1	21.6	27.3	30.1	26.7
42	16566	25.2	34.6	31.4	35.8	30.4	33.7	35.9	33.6
43	40771	25.3	31.2	28.2	32.7	27.2	30.2	34.2	30.6
44	9534	34.8	24.9	20.4	22.5	18.2	21.7	26.1	22.3
45	15536	22.4	36.5	29.2	34.7	32.6	33.9	39.3	34.4
46	16077	27.9	36.9	28.2	28.7	26.2	25.7	31.6	29.6
153	10596	1.2	54.1	51.3	63.5	59.9	56.7	66.0	58.6

REGION -N.WEST ATTACK 230 INTEGRATED DOSE INTERVAL=0-999

POPULATION ITEM	TOTALS	PROMPT	15 DEC 51	25 DEC 51	15 MAY 51	15 JUN 51	5 JUL 52	25 NOV 50	SIX WIND AVERAGE
1	162957	2.2	57.7	70.4	44.0	57.2	60.8	73.4	60.6
3	46222	33.4	37.6	46.4	28.5	31.4	34.3	47.9	37.7
6	30440	45.9	27.8	35.6	19.5	21.8	24.5	37.1	27.7
7	30091	4.6	55.3	71.4	42.2	49.4	58.3	70.7	57.9
10	50088	31.3	37.0	46.3	27.9	31.0	34.1	47.3	37.3
12	46262	38.1	37.6	45.0	29.0	31.5	34.2	46.6	37.3
24	18408	40.2	30.3	37.1	21.0	24.0	26.1	40.0	29.7
25	9248	37.6	34.4	42.1	25.3	28.2	30.6	44.3	34.2
74	24168	50.5	28.2	34.4	22.0	23.6	26.3	36.3	28.5
94	32511	42.8	37.5	42.5	30.8	33.3	34.7	42.6	36.9
135	62429	2.5	42.0	63.6	29.9	43.1	49.1	69.6	49.5
148	98111	3.8	39.9	66.8	29.2	35.9	51.1	66.4	48.2
149	57546	3.5	31.2	60.5	23.4	27.6	45.1	64.9	42.1
150	11300	6.2	70.4	72.3	51.4	58.2	61.2	71.4	64.1
151	5946	6.9	64.4	77.6	44.1	49.5	53.8	75.8	60.9
152	23327	2.6	40.5	76.9	29.0	42.2	60.0	65.1	52.3
159	30570	3.5	45.2	70.8	34.6	41.5	57.3	71.0	53.4
37	16370	35.8	36.3	44.2	27.3	30.2	33.1	46.1	36.2
38	10772	4.7	47.7	67.9	34.6	41.2	53.3	65.4	51.7
39	10764	31.1	35.5	44.8	26.3	29.7	32.5	48.8	36.3
40	27160	32.1	44.4	47.9	34.9	37.9	37.5	48.8	41.9
41	12464	36.1	34.4	43.3	25.0	26.5	30.3	48.8	34.7
42	12767	42.8	30.1	37.5	21.4	23.9	26.6	39.4	29.8
43	32594	39.4	33.6	41.6	24.6	27.5	30.8	42.8	33.5
44	6689	49.9	26.7	33.1	18.2	20.9	23.2	33.7	26.0
45	10321	31.5	39.4	46.8	30.8	33.7	36.0	52.3	39.8
46	6344	38.4	35.7	45.8	24.7	30.3	32.1	47.2	36.0
153	2504	3.3	51.6	73.2	37.7	50.9	60.4	70.9	57.4

U. S. TOTALS ATTACK 230 INTEGRATED DOSE INTERVAL=0-2999

POPULATION ITEM	TOTALS	PROMPT	15 DEC 51	25 DEC 51	15 MAY 51	15 JUN 51	5 JUL 52	25 NOV 50	SIX WIND AVERAGE
1	2971499	1.8	80.1	77.0	71.6	73.5	73.3	74.0	74.9
3	1784656	24.6	48.1	47.2	35.8	38.3	41.1	41.4	42.0
6	1246526	32.8	39.8	39.7	27.8	29.7	33.2	34.0	34.0
7	1342059	1.8	75.9	69.3	58.9	65.2	68.3	66.0	67.3
10	2019872	24.2	48.8	48.0	35.8	38.6	41.7	41.4	42.4
12	1653024	24.0	49.5	48.0	37.7	40.0	42.2	42.9	43.4
24	675084	30.6	39.8	40.5	26.5	28.0	32.7	34.1	33.6
25	329959	26.4	43.8	43.5	31.2	33.1	36.5	37.5	37.6
74	**1103668**	**41.5**	**36.6**	**35.2**	**26.0**	**27.4**	**31.9**	**30.5**	**31.3**
94	1387922	30.6	42.5	41.7	28.3	30.8	36.7	32.6	35.4
135	1750307	1.5	83.5	79.4	70.7	73.7	74.0	76.8	76.4
148	3039695	2.8	77.4	70.8	57.4	64.0	67.2	69.1	67.7
149	1331375	3.3	74.0	69.3	53.8	62.1	64.8	67.5	65.2
150	401179	3.3	76.6	71.6	60.2	58.7	63.4	59.7	65.1
151	225141	3.3	65.8	61.3	53.9	58.2	61.3	61.7	60.4
152	1076563	1.9	84.2	74.8	61.9	69.3	72.6	76.5	73.2
159	1961169	2.5	70.3	64.7	51.6	60.4	63.1	60.1	61.7
37	642352	26.0	46.8	45.8	34.4	36.9	39.9	40.0	40.6
38	424202	3.1	73.3	68.4	57.1	62.6	65.3	65.1	65.3
39	379219	23.5	48.4	48.4	36.2	38.9	40.7	42.5	42.5
40	982094	25.7	45.0	44.4	32.0	33.5	38.2	36.1	38.2
41	765932	25.3	45.1	43.8	32.8	36.1	39.4	38.2	39.2
42	443688	28.4	45.4	44.8	32.9	34.7	38.0	38.9	39.1
43	1174589	27.2	46.4	45.3	33.9	36.5	39.1	39.9	40.2
44	268623	34.3	37.2	37.1	25.4	27;9	31.3	33.9	32.1
45	337926	23.4	49.7	48.8	37.5	39.5	43.4	42.6	43.6
46	317218	34.7	39.8	39.0	28.2	29.5	32.0	33.7	33.7
153	92303	1.7	81.4	75.7	65.6	68.3	72.5	73.6	72.8

REGION -N.EAST ATTACK 230 INTEGRATED DOSE INTERVAL=0-2999

POPULATION ITEM	TOTALS	PROMPT	15 DEC 51	25 DEC 51	15 MAY 51	15 JUN 51	5 JUL 52	25 NOV 50	SIX WIND AVERAGE
1	163593	3.8	67.3	71.9	70.2	52.7	59.5	34.0	59.2
3	446779	29.3	21.8	28.3	26.9	20.5	21.6	27.8	24.5
6	357939	34.6	16.3	22.0	20.7	15.3	16.2	27.1	19.6
7	91118	3.7	64.8	68.2	65.7	49.6	55.9	23.8	54.7
10	465707	27.9	22.7	28.9	27.7	21.0	22.3	28.9	25.3
12	449988	30.0	23.5	29.2	28.4	21.8	22.6	25.8	25.2
24	204904	30.0	14.9	24.5	20.1	14.4	16.1	30.1	20.0
25	93456	30.7	18.4	26.2	23.6	17.5	18.8	28.1	22.1
74	**384765**	**57.1**	**9.8**	**13.7**	**13.1**	**9.9**	**10.9**	**17.7**	**12.5**
94	452781	34.0	20.8	25.9	26.2	19.3	20.6	24.7	22.9
135	56329	3.2	69.3	71.7	68.9	51.5	58.4	25.0	57.5
148	229209	4.9	58.4	63.4	59.4	41.8	48.3	25.1	49.4
149	66431	7.4	49.4	53.7	50.2	40.6	45.4	32.7	45.3
150	96556	3.4	67.1	69.7	66.7	45.6	54.5	18.5	53.7
151	40157	5.3	48.3	59.2	53.1	34.7	38.3	31.7	44.2
152	26105	3.8	64.4	71.5	65.4	41.8	48.2	19.7	51.8
159	164942	5.1	55.8	60.7	58.4	48.1	51.6	29.0	50.6
37	170972	30.5	20.6	27.3	25.9	19.4	20.5	26.8	23.4
38	34351	6.4	54.1	60.6	57.1	41.0	47.4	25.2	47.6
39	87191	26.4	21.3	29.9	27.0	20.0	21.3	29.3	24.8
40	305811	25.3	23.3	30.4	30.9	23.5	24.9	31.5	27.4
41	265616	31.3	19.9	26.1	26.2	18.8	18.9	21.6	21.9
42	118945	32.2	19.4	25.2	23.2	18.7	19.1	29.3	22.5
43	297900	31.7	19.8	25.9	24.1	18.4	19.3	27.2	22.5
44	86053	37.5	12.1	20.1	15.3	11.4	14.0	26.9	16.6
45	82973	27.5	23.9	30.7	29.1	21.4	22.7	26.4	25.7
46	77800	33.2	20.0	25.4	23.2	16.2	18.2	24.9	21.3
153	5010	3.1	69.4	72.3	67.9	47.8	56.0	21.0	55.7

REGION -S.EAST ATTACK 230 INTEGRATED DOSE INTERVAL=0-2999

POPULATION ITEM	TOTALS	PROMPT	15 DEC 51	25 DEC 51	15 MAY 51	15 JUN 51	5 JUL 52	25 NOV 50	SIX WIND AVERAGE
1	447603	2.4	66.5	61.8	52.4	62.6	60.3	59.8	60.6
3	380213	19.7	52.6	47.9	38.4	49.7	40.7	47.9	46.2
6	206611	31.3	42.6	40.1	30.6	41.2	28.4	40.4	37.2
7	440215	1.8	64.3	55.7	49.5	61.3	59.3	55.6	57.6
10	439169	20.6	50.5	46.3	36.7	47.9	39.1	46.1	44.4
12	315169	16.7	57.5	53.1	42.2	54.4	42.2	52.3	50.3
24	93789	32.4	42.4	38.6	28.1	37.2	25.8	37.0	34.9
25	55109	25.7	48.6	44.7	34.1	44.7	33.8	43.9	41.6
74	152237	31.2	43.9	40.8	32.6	41.7	29.9	40.7	38.3
94	195435	21.6	47.5	44.7	31.2	48.2	44.0	44.0	43.3
135	236925	1.7	66.8	60.4	51.9	61.8	58.9	59.3	59.9
148	526412	2.6	64.7	53.8	46.7	61.5	54.3	52.6	55.6
149	293619	2.9	61.2	50.4	44.5	63.3	51.7	48.6	53.3
150	53651	3.7	70.4	65.6	47.4	54.2	49.3	59.0	57.7
151	71310	1.8	65.1	50.4	51.3	61.9	63.4	60.5	58.8
152	103448	1.9	69.2	62.8	52.1	57.3	55.6	58.3	59.2
159	776310	2.6	60.2	52.6	40.5	58.5	54.5	51.5	53.0
37	128971	21.1	51.5	47.0	37.2	49.2	40.2	47.6	45.5
38	120665	2.6	62.7	54.6	47.2	61.1	55.2	54.1	55.8
39	67450	20.3	54.1	49.4	38.9	50.8	39.2	49.3	46.9
40	122760	17.4	48.4	48.6	38.9	48.4	40.7	46.8	45.3
41	183746	14.2	59.4	49.8	39.4	58.1	55.3	56.7	53.1
42	81201	26.1	47.8	45.7	35.6	44.3	32.6	44.4	41.7
43	227604	23.2	50.4	46.5	36.4	48.0	36.8	46.6	44.1
44	45079	30.8	44.3	41.1	30.2	42.1	28.3	41.1	37.9
45	66285	20.5	52.0	47.9	37.6	49.5	42.5	48.5	46.3
46	77608	42.1	34.8	32.4	23.3	29.5	21.2	30.4	28.6
153	13755	1.8	69.6	65.0	56.1	61.6	57.8	62.9	62.2

REGION -E.N.C. ATTACK 230 INTEGRATED DOSE INTERVAL=0-2999

POPULATION ITEM	TOTALS	PROMPT	15 DEC 51	25 DEC 51	15 MAY 51	15 JUN 51	5 JUL 52	25 NOV 50	SIX WIND AVERAGE
1	244511	1.5	64.3	78.0	61.8	68.8	70.7	67.9	71.9
3	362252	20.5	69.4	64.3	36.0	40.3	54.3	38.2	50.4
6	264368	26.9	65.1	61.3	28.5	33.2	51.8	30.3	45.0
7	256227	1.1	83.5	74.4	60.2	65.4	66.6	68.4	69.8
10	424715	20.0	69.7	64.4	35.7	40.9	54.8	37.8	50.6
12	336007	20.0	69.6	64.4	38.7	42.0	54.4	41.8	51.8
24	157831	24.6	68.4	62.6	28.9	33.6	53.0	29.5	46.0
25	71985	22.7	68.7	63.1	32.7	37.0	53.5	34.4	48.2
74	215192	30.7	62.4	59.6	25.1	28.1	52.7	27.9	42.6
94	407382	25.1	67.3	61.3	28.5	33.5	51.2	32.9	45.8
135	161541	1.1	83.7	74.4	60.6	63.7	67.3	69.1	69.8
148	520343	1.4	66.8	73.3	60.7	62.0	67.9	68.9	69.9
149	191030	1.9	85.0	71.6	53.1	58.6	64.6	62.8	65.9
150	106538	0.8	89.6	75.7	66.2	69.6	70.8	79.1	75.2
151	26556	0.9	82.6	77.6	59.5	66.5	61.8	73.7	70.3
152	196279	1.2	87.6	73.0	65.3	60.6	70.4	68.6	70.9
159	423744	1.2	84.0	72.1	58.3	60.2	64.5	63.9	67.2
37	132985	21.4	69.2	63.8	34.8	39.1	54.0	37.2	49.7
38	67174	1.8	84.7	74.7	60.9	63.1	66.3	69.0	69.8
39	65183	16.7	70.8	65.2	37.1	42.0	55.9	38.7	51.6
40	325222	22.5	66.1	61.0	33.2	38.0	51.3	34.4	47.7
41	141252	21.1	71.3	67.2	32.0	36.3	52.1	38.8	49.6
42	68646	21.9	69.1	65.5	32.6	35.7	55.7	35.1	48.9
43	235700	22.1	66.4	63.3	34.7	39.1	54.1	36.7	49.4
44	48377	26.4	65.5	61.2	28.0	33.2	53.4	30.3	45.3
45	66371	17.9	72.1	67.0	41.4	44.4	58.3	39.4	53.8
46	50521	25.8	64.9	61.8	30.3	35.8	52.7	31.6	46.2
153	13672	0.9	66.8	74.2	64.8	64.9	70.5	73.7	72.5

REGION -W.N.C. ATTACK 230 INTEGRATED DOSE INTERVAL=0-2999

POPULATION ITEM	TOTALS	PROMPT	15 DEC 51	25 DEC 51	15 MAY 51	15 JUN 51	5 JUL 52	25 NOV 50	SIX WIND AVERAGE
1	509674	0.6	96.1	90.4	78.4	87.9	89.9	93.4	89.4
3	153950	25.9	71.4	62.4	46.8	57.3	60.8	65.1	60.6
6	90463	41.8	56.7	48.2	33.2	41.8	45.2	49.7	45.8
7	262916	0.7	95.6	85.0	67.3	83.5	86.2	89.7	84.6
10	175661	26.5	71.2	62.3	45.9	57.2	60.8	65.1	60.4
12	172061	23.7	72.7	63.8	49.3	59.1	62.7	66.6	62.4
24	44979	37.9	60.9	50.1	34.9	43.4	47.2	52.8	48.2
25	25952	32.3	65.5	56.0	40.8	50.2	53.7	58.7	54.2
74	92623	39.5	58.5	50.3	38.3	46.9	49.5	52.9	49.4
94	86723	46.9	52.1	41.4	28.0	37.1	42.3	45.4	41.0
135	440663	0.5	96.7	90.7	76.9	88.1	89.7	93.6	89.3
148	779900	0.8	95.8	84.2	63.7	84.6	86.9	91.2	84.6
149	247491	0.9	97.1	88.9	63.8	88.2	88.2	91.6	86.3
150	64587	0.7	97.0	86.7	66.9	80.0	88.0	87.9	84.4
151	32569	0.5	95.7	85.7	66.6	86.8	89.9	89.8	85.7
152	435310	0.8	96.6	81.0	63.0	82.9	85.9	91.5	83.5
159	263030	0.8	93.9	85.1	62.2	82.4	85.7	86.8	82.7
37	55562	28.0	69.6	60.2	45.2	55.3	58.8	63.0	58.7
38	69565	0.8	96.0	85.7	67.5	84.1	86.5	90.3	85.0
39	31439	25.6	71.7	62.5	46.5	56.3	60.0	65.0	60.3
40	51123	38.4	60.2	48.0	32.7	43.5	46.7	53.9	47.5
41	52455	36.6	60.4	51.3	38.2	43.8	49.2	52.2	49.2
42	41699	35.8	61.7	53.0	38.8	46.4	50.2	54.7	50.8
43	108469	29.2	68.4	59.3	43.9	54.5	57.6	61.7	57.6
44	21644	43.3	55.4	46.1	32.4	40.3	43.7	48.2	44.4
45	32497	23.3	74.6	63.7	48.4	60.2	63.0	67.5	62.9
46	23281	34.8	62.7	55.3	41.2	49.1	52.8	56.9	53.0
153	28376	0.6	96.4	85.5	69.7	83.6	86.5	91.4	85.5

REGION -S.CEN. ATTACK 230 INTEGRATED DOSE INTERVAL=0-2999

POPULATION ITEM	TOTALS	PROMPT	15 DEC 51	25 DEC 51	15 MAY 51	15 JUN 51	5 JUL 52	25 NOV 50	SIX WIND AVERAGE
1	429332	1.9	68.6	71.9	71.9	62.4	67.4	67.5	68.3
3	169520	17.5	56.4	58.1	55.6	47.6	55.1	44.4	52.9
6	114777	24.0	55.2	56.3	52.9	46.5	49.7	38.1	49.8
7	151832	2.2	63.5	61.2	63.4	51.7	69.7	62.0	61.9
10	202267	18.6	57.0	59.1	57.0	47.9	54.9	43.3	53.2
12	142779	14.4	55.1	55.7	52.8	47.2	56.9	48.0	52.6
24	44549	23.1	55.8	56.3	53.2	46.7	49.0	37.5	49.8
25	25801	20.8	55.9	56.6	53.3	46.8	50.8	40.6	50.7
74	98472	24.0	54.6	54.6	51.4	46.2	49.3	35.3	48.6
94	71366	21.5	52.7	60.7	55.7	53.6	52.7	35.0	51.7
135	321592	1.9	74.0	74.8	73.6	63.3	64.9	70.7	70.2
148	365893	2.8	73.1	67.2	68.0	56.4	63.0	68.6	66.0
149	205064	2.6	77.5	70.8	70.7	58.1	64.5	72.6	69.0
150	20712	4.5	63.4	55.7	60.1	44.5	61.2	56.6	56.9
151	22774	1.7	58.2	50.1	69.5	62.6	71.7	67.6	63.3
152	117907	3.1	69.9	66.5	64.6	54.5	59.3	64.1	63.1
159	133425	2.0	65.8	65.6	70.6	53.9	72.7	63.9	65.4
37	56573	18.6	56.1	57.2	54.4	47.6	54.0	43.1	52.1
38	53441	2.8	60.4	65.6	66.1	53.3	68.6	62.5	63.7
39	42626	17.8	56.1	58.2	55.2	46.1	54.0	42.3	52.0
40	41752	21.5	50.2	49.2	48.2	47.4	49.4	37.6	47.0
41	49790	17.0	56.2	60.5	56.3	53.2	56.0	41.3	53.9
42	42478	19.6	57.1	58.4	55.5	50.2	53.4	39.7	52.4
43	117375	20.0	55.9	56.8	53.9	47.0	52.6	42.2	51.4
44	21910	26.0	51.8	52.0	48.5	43.5	46.0	34.7	46.1
45	32287	16.5	55.5	56.6	54.1	44.2	55.7	45.7	52.0
46	28182	30.0	50.3	48.7	44.8	35.6	41.5	38.4	43.2
153	14690	2.4	63.3	63.8	63.9	50.9	65.6	60.0	61.2

POPULATION ITEM	TOTALS	PROMPT	15 DEC 51	25 DEC 51	15 MAY 51	15 JUN 51	5 JUL 52	25 NOV 50	SIX WIND AVERAGE
	REGION -MOUNT.			ATTACK 230		INTEGRATED DOSE INTERVAL=0-2999			
1	656956	0.9	88.4	80.2	84.1	84.2	78.3	80.4	82.6
3	68547	22.5	63.3	61.0	46.2	42.6	50.0	53.3	52.7
6	46012	31.7	52.7	52.0	35.0	29.3	40.4	42.3	42.0
7	57070	1.7	90.4	85.3	76.0	77.0	74.6	80.8	80.7
10	67708	21.7	64.3	62.2	45.9	42.6	51.0	53.9	53.3
12	52764	24.1	62.8	59.8	49.0	46.1	50.7	54.2	53.7
24	23418	28.6	56.7	55.1	37.7	33.2	42.1	44.6	44.9
25	12139	26.1	59.4	57.3	42.0	37.5	45.8	48.4	48.4
74	35254	34.9	50.8	49.0	39.9	35.6	39.1	41.8	42.7
94	20764	33.9	51.6	48.9	29.0	23.6	42.7	42.4	39.7
135	413186	1.1	90.6	83.8	81.6	84.1	79.7	82.4	83.7
148	235616	2.2	80.9	76.4	67.0	68.9	64.2	73.5	71.8
149	98267	2.4	73.5	68.8	64.7	61.8	60.2	68.6	66.3
150	15279	3.4	85.0	78.8	64.1	65.8	62.9	73.2	71.6
151	4670	4.6	83.7	80.7	60.5	58.4	66.4	69.1	69.8
152	117267	1.8	86.4	82.3	69.5	75.6	67.7	77.9	76.6
159	50553	2.4	69.4	67.4	64.9	58.4	57.6	65.2	63.8
37	23309	24.1	61.8	59.6	45.1	40.9	48.7	51.3	51.2
38	22353	3.0	81.7	77.1	69.9	68.6	67.4	73.3	73.0
39	18373	22.1	62.5	60.8	43.6	41.1	46.7	52.1	51.1
40	16743	26.7	55.5	52.7	33.1	26.2	46.7	48.4	43.8
41	12782	33.3	55.2	54.8	37.0	33.9	45.4	45.9	45.4
42	18508	25.2	63.8	61.3	47.5	42.4	51.7	51.4	53.0
43	40771	26.3	59.6	57.4	43.8	39.0	47.3	49.4	49.4
44	9534	34.8	48.2	47.0	31.5	27.5	36.4	38.9	38.3
45	15536	22.4	64.9	62.5	46.1	45.2	50.9	56.5	54.3
46	16077	27.9	59.8	58.7	39.0	39.2	46.0	45.5	48.1
153	10596	1.2	90.0	84.5	78.6	80.6	77.1	81.1	82.0

POPULATION ITEM	TOTALS	PROMPT	15 DEC 51	25 DEC 51	15 MAY 51	15 JUN 51	5 JUL 52	25 NOV 50	SIX WIND AVERAGE
	REGION -N.WEST			ATTACK 230		INTEGRATED DOSE INTERVAL=0-2999			
1	162957	2.2	89.8	90.8	74.4	79.0	78.9	93.8	84.5
3	46222	33.4	61.9	63.2	40.2	54.4	57.1	63.8	56.8
6	30440	45.9	49.9	51.4	28.4	44.1	46.7	51.6	45.4
7	30091	4.6	87.5	91.1	63.7	69.9	76.2	91.4	80.0
10	50088	31.3	63.6	65.2	39.9	56.0	59.0	65.8	58.2
12	46262	38.1	58.3	58.6	39.5	51.1	53.1	59.3	53.3
24	18468	40.2	55.0	57.2	32.0	48.9	51.1	57.4	50.3
25	9248	37.6	57.9	59.5	36.5	51.3	53.6	59.9	53.1
74	24168	50.5	45.8	46.7	29.7	38.5	41.0	47.1	41.5
94	32311	42.8	56.2	53.9	38.6	50.8	51.6	54.3	50.9
135	62429	2.5	83.4	89.3	62.0	65.5	70.3	90.9	76.9
148	98111	3.8	80.9	93.2	53.3	58.4	74.1	92.8	75.4
149	57546	3.5	77.5	93.6	47.4	49.7	68.7	92.7	71.6
150	11500	6.2	89.0	90.8	72.6	78.6	79.0	91.3	83.6
151	5946	6.9	90.4	92.6	58.3	78.1	81.4	91.2	82.0
152	23327	2.6	82.9	93.1	57.1	65.3	83.1	94.0	79.3
159	36570	3.5	78.0	95.2	59.0	62.6	77.0	93.6	77.6
37	16370	35.6	59.5	61.1	38.8	52.3	54.8	61.7	54.7
38	10772	4.7	85.6	91.3	56.6	62.6	72.9	91.2	76.7
39	10764	31.1	61.2	65.8	39.3	53.7	56.4	66.3	57.1
40	27160	32.1	66.9	65.4	45.7	63.8	63.2	66.1	61.8
41	12454	36.1	54.8	62.0	36.4	49.2	51.8	62.1	52.7
42	12767	42.8	52.8	54.1	32.5	46.2	48.2	54.5	48.0
43	32594	39.4	56.5	57.5	35.5	48.9	51.7	57.9	51.3
44	6889	49.9	47.3	47.5	27.4	41.7	43.7	47.7	42.6
45	10321	31.5	63.1	65.2	41.7	54.1	58.6	65.8	58.1
46	6344	36.4	57.0	58.6	37.6	51.3	53.4	59.1	52.8
153	2504	3.3	86.6	91.1	66.3	74.5	79.7	92.5	81.8

U. S. TOTALS — ATTACK 310 — INTEGRATED DOSE INTERVAL=0-999

POPULATION ITEM	TOTALS	PROMPT	15 DEC 51	25 DEC 51	15 MAY 51	15 JUN 51	5 JUL 52	25 NOV 50	SIX WIND AVERAGE
1	2971499	2.2	44.8	44.4	54.1	54.7	53.6	46.7	49.7
3	1784656	24.4	17.6	19.1	23.6	25.5	24.8	24.1	22.5
6	1246526	32.6	14.4	14.4	17.0	18.7	17.6	19.3	16.9
7	1343059	2.1	27.3	33.5	42.9	46.0	47.8	36.6	39.0
10	2019872	24.0	17.8	19.4	23.3	25.1	24.7	24.0	22.4
12	1653024	23.8	18.7	19.6	25.1	27.2	26.3	24.9	23.6
24	675084	29.1	13.7	14.6	16.0	18.1	17.0	20.1	16.6
25	329959	27.6	15.9	16.7	19.7	21.8	20.7	22.1	19.5
74	1103668	41.4	13.6	12.8	16.3	17.9	16.8	17.7	15.9
94	1387922	30.9	12.8	13.4	17.6	21.3	19.2	18.5	17.1
135	1750307	2.0	43.4	43.6	50.8	52.3	52.6	43.7	47.7
148	3039695	3.0	34.7	36.0	38.7	46.0	47.3	36.9	39.9
149	1331375	3.5	33.9	35.5	37.8	42.7	46.3	36.2	38.7
150	401179	3.5	25.9	31.0	36.9	42.9	42.5	34.8	35.7
151	225141	3.4	26.6	29.6	42.5	45.4	45.4	35.3	37.5
152	1076563	2.1	40.8	40.1	40.0	51.6	51.0	39.0	43.8
159	1961169	2.7	27.7	30.3	36.9	42.4	44.8	32.9	35.9
37	642352	25.7	17.1	18.3	22.6	24.8	23.9	23.3	21.7
38	424202	3.2	29.1	34.2	40.4	44.0	45.7	35.5	38.2
39	379219	23.1	18.8	20.9	24.2	25.6	24.8	25.5	23.3
40	982094	25.1	14.0	15.1	20.2	23.2	20.6	21.1	19.0
41	765932	25.7	14.7	16.5	21.7	25.9	25.7	22.5	21.2
42	443688	28.6	16.1	17.0	20.9	21.9	21.3	22.6	20.0
43	1174589	26.8	17.4	18.3	21.9	23.8	23.1	23.2	21.3
44	268623	33.1	14.2	14.5	16.0	17.9	16.9	19.2	16.5
45	337926	23.0	19.5	19.6	24.5	27.3	27.1	25.3	23.9
46	317218	33.8	15.7	15.3	18.3	19.7	18.1	18.7	17.6
153	92303	2.0	35.7	39.7	44.4	48.0	49.9	38.5	42.7

REGION -N.EAST — ATTACK 310 — INTEGRATED DOSE INTERVAL=0-999

POPULATION ITEM	TOTALS	PROMPT	15 DEC 51	25 DEC 51	15 MAY 51	15 JUN 51	5 JUL 52	25 NOV 50	SIX WIND AVERAGE
1	163593	3.5	19.2	25.3	45.4	56.6	37.3	24.4	34.7
3	446779	29.7	3.6	5.6	15.9	18.9	14.4	14.1	12.1
6	357939	35.3	2.2	3.8	11.9	13.9	10.1	12.0	9.0
7	91118	3.3	10.9	16.5	43.5	52.7	37.4	19.1	30.0
10	465707	28.2	3.7	6.1	16.4	19.2	14.6	15.0	12.5
12	449988	30.6	4.0	5.6	16.7	20.3	15.2	13.1	12.5
24	204904	29.2	2.0	4.2	11.5	13.2	10.1	15.2	9.4
25	93456	30.6	2.9	4.9	13.7	16.1	12.2	14.1	10.6
74	384765	58.3	1.6	3.2	7.2	8.8	6.8	6.3	5.6
94	452781	35.2	3.2	4.2	15.7	18.0	13.4	11.0	10.9
135	56329	2.8	14.4	19.5	42.9	55.6	37.5	20.2	31.7
148	229209	4.6	9.3	15.9	41.7	46.5	31.7	17.2	27.1
149	66431	7.1	5.0	17.6	40.0	45.2	32.2	14.6	25.8
150	96556	2.9	13.0	17.3	41.7	51.9	32.7	17.6	29.0
151	40137	5.1	7.7	11.0	40.9	35.8	27.9	20.8	24.0
152	26105	3.6	8.6	13.9	47.6	46.2	32.7	16.9	27.6
159	164942	5.1	7.4	18.5	43.6	51.7	37.6	15.5	29.1
37	170972	30.9	3.4	5.2	15.2	17.9	13.5	12.9	11.4
38	34351	5.6	8.9	15.1	37.7	44.6	30.8	18.6	25.9
39	87191	26.3	3.4	6.0	15.9	18.2	14.1	15.6	12.2
40	305811	25.3	3.6	6.4	18.3	22.1	14.8	15.7	13.5
41	265616	32.3	3.7	3.7	15.5	17.5	14.1	9.1	10.6
42	118945	33.2	3.0	4.3	13.7	16.7	13.0	13.4	10.7
43	297900	32.1	3.2	5.0	14.0	16.7	12.8	13.0	10.3
44	86053	37.9	2.0	5.1	8.8	10.5	8.0	10.1	7.4
45	82973	27.1	4.7	6.2	17.7	20.3	15.3	14.2	13.0
46	77800	33.7	2.7	4.9	14.0	14.6	11.2	10.6	9.7
153	5010	2.5	12.7	18.0	42.9	53.5	34.8	19.1	30.2

REGION -S.EAST — ATTACK 310 — INTEGRATED DOSE INTERVAL=0-999

POPULATION ITEM	TOTALS	PROMPT	15 DEC 51	25 DEC 51	15 MAY 51	15 JUN 51	5 JUL 52	25 NOV 50	SIX WIND AVERAGE
1	447603	2.3	24.1	35.9	49.0	44.7	50.6	33.9	39.7
3	380213	20.3	20.1	28.7	36.8	35.1	33.2	32.2	31.0
6	206611	32.8	19.4	23.0	28.8	27.9	23.0	28.0	25.0
7	440215	1.9	17.4	35.5	51.2	45.7	47.5	34.2	38.6
10	439165	21.0	19.3	27.4	34.9	33.6	32.1	29.9	29.5
12	315169	17.7	23.8	31.9	41.1	37.3	34.7	36.1	34.2
24	93789	32.7	17.3	22.8	26.6	25.0	20.5	26.2	23.1
25	55109	26.3	19.6	26.6	32.4	30.8	27.3	30.8	27.9
74	152237	32.9	20.1	23.2	31.7	26.8	24.0	30.0	26.0
94	195435	25.2	18.2	28.2	29.8	36.3	35.2	32.3	30.0
135	236925	1.7	22.9	35.8	49.2	42.7	48.1	32.9	38.6
148	526412	2.6	24.7	34.5	46.9	41.8	43.7	30.6	37.0
149	293619	2.7	25.2	34.7	44.0	41.5	43.5	27.4	36.0
150	53851	4.1	23.5	39.4	46.8	38.7	38.6	37.5	37.4
151	71310	1.7	30.7	33.9	56.4	51.1	57.6	39.5	44.9
152	103448	1.8	21.5	34.1	51.4	40.4	39.9	32.0	36.5
159	776310	2.6	24.5	32.6	39.4	40.0	45.0	28.2	35.0
37	128971	21.8	20.4	28.5	35.9	35.2	33.1	32.7	31.0
38	120665	2.6	21.3	35.0	47.9	43.4	44.5	31.7	37.3
39	87450	20.3	23.3	30.8	37.5	36.6	32.4	33.8	32.4
40	122760	20.3	17.2	30.6	36.4	35.7	33.4	32.7	31.0
41	183746	15.2	24.5	32.6	38.2	46.4	47.8	41.0	38.4
42	81201	26.8	17.3	24.9	33.7	29.3	26.4	30.9	27.1
43	227604	23.5	20.9	27.8	35.0	33.3	30.1	32.0	29.8
44	45079	30.6	21.0	24.8	28.9	28.1	23.0	29.5	25.9
45	66285	20.8	20.7	29.0	36.8	36.6	34.7	32.9	31.8
46	77608	42.8	13.4	16.6	21.1	20.2	16.8	18.3	17.7
153	13755	1.8	22.4	37.7	52.9	41.3	44.9	33.5	38.6

REGION -E.N.C. — ATTACK 310 — INTEGRATED DOSE INTERVAL=0-999

POPULATION ITEM	TOTALS	PROMPT	15 DEC 51	25 DEC 51	15 MAY 51	15 JUN 51	5 JUL 52	25 NOV 50	SIX WIND AVERAGE
1	244811	1.9	31.6	29.3	31.5	36.8	40.4	40.0	34.9
3	362252	19.5	18.1	14.5	18.0	23.5	22.5	19.8	19.4
6	264368	25.6	15.6	12.0	13.2	19.6	18.0	14.1	15.5
7	256227	1.4	28.3	23.4	30.6	37.1	40.3	39.6	33.2
10	424715	19.3	18.0	14.3	17.8	23.5	23.2	19.5	19.4
12	336007	19.1	19.4	15.6	19.3	24.5	23.0	22.0	20.6
24	157831	22.4	15.4	13.2	13.4	19.8	19.1	13.8	15.8
25	71985	21.2	17.0	13.7	15.9	21.9	20.7	17.0	17.7
74	215192	28.9	12.6	8.6	11.5	18.2	15.0	13.4	13.2
94	407382	24.7	15.7	12.1	15.6	21.5	17.8	16.1	16.5
135	161541	1.4	30.2	24.7	29.8	37.1	41.0	38.4	33.5
148	520343	1.7	33.4	25.4	30.3	38.4	41.8	35.7	34.2
149	191030	2.2	37.1	19.6	25.9	37.0	37.9	31.0	31.4
150	106538	1.3	25.6	27.0	28.4	37.6	49.0	41.6	34.9
151	26556	1.2	25.7	24.9	33.9	37.3	32.6	39.8	32.4
152	196279	1.4	35.1	30.3	35.2	40.4	42.9	36.6	36.8
159	423744	1.6	32.2	19.3	30.3	35.7	34.6	30.3	31.4
37	132985	20.2	17.8	14.2	17.3	23.0	21.8	19.0	18.9
38	67174	2.0	28.8	24.7	29.5	36.2	41.2	37.5	33.0
39	65183	17.7	18.3	15.8	18.5	24.6	23.0	19.5	19.9
40	325222	21.6	17.7	13.0	18.6	22.4	20.6	19.3	18.6
41	141252	19.7	15.9	13.3	16.1	21.3	20.4	19.4	17.7
42	66648	21.0	16.7	13.9	15.2	20.0	19.5	16.8	17.0
43	235700	20.8	17.9	14.2	16.5	22.9	21.5	18.3	18.6
44	46377	23.9	15.6	12.6	12.5	20.0	18.1	13.6	15.4
45	66371	17.2	20.5	14.0	20.2	26.3	27.2	19.1	21.2
46	50521	23.5	15.8	12.8	13.3	22.3	17.4	14.3	16.0
153	13672	1.2	28.8	28.7	31.5	38.0	45.3	38.7	35.2

REGION -W.N.C. ATTACK 310 INTEGRATED DOSE INTERVAL=0-99

POPULATION ITEM	TOTALS	PROMPT	15 DEC 51	25 DEC 51	15 MAY 51	15 JUN 51	5 JUL 52	25 NOV 50	SIX WIND AVERAGE
1	509674	2.0	42.3	38.0	44.3	54.2	50.2	43.1	45.3
3	153950	22.9	25.9	23.6	22.6	38.4	35.5	32.5	29.8
6	90463	36.4	18.1	16.3	15.2	27.0	26.1	25.3	21.3
7	262916	1.5	38.6	37.5	35.4	59.4	52.4	42.2	44.2
10	175861	23.2	25.5	22.9	22.3	37.8	34.7	32.9	29.3
12	172061	21.3	27.3	26.0	24.5	40.9	38.4	33.2	31.7
24	44979	32.1	19.3	16.7	14.9	28.2	26.9	27.4	22.2
25	25952	28.2	22.7	20.2	18.9	33.2	31.1	29.7	26.0
74	92623	35.5	22.1	20.2	19.0	32.2	30.4	25.9	[illegible]
94	86723	41.3	16.7	13.5	11.4	25.1	24.3	24.6	19.3
135	440663	2.0	40.6	40.2	43.2	56.0	51.5	40.1	45.3
148	779900	1.5	43.0	38.8	33.4	62.5	56.3	39.8	45.6
149	247491	2.3	39.1	35.6	32.0	61.0	56.6	41.2	44.3
150	64587	1.2	33.2	40.6	37.0	57.9	49.9	44.4	43.6
151	32569	0.8	40.2	42.0	36.3	69.2	55.2	41.4	47.4
152	435310	1.3	46.8	40.1	33.4	63.6	57.1	38.2	46.5
159	263030	1.8	32.9	32.7	28.2	61.9	57.0	42.5	42.5
37	55582	24.7	25.2	23.2	22.1	37.6	34.9	31.7	29.1
38	89565	1.5	39.4	38.5	36.1	60.2	53.5	42.0	[illegible]
39	31439	22.2	24.8	23.1	22.4	37.6	35.5	33.1	29.4
40	51123	34.0	17.8	13.7	12.3	29.2	25.2	29.8	21.3
41	52455	31.7	18.7	18.5	15.8	31.2	30.2	27.2	23.6
42	41659	31.4	21.2	19.3	18.7	30.8	28.9	27.5	24.4
43	108469	25.7	25.1	23.0	21.9	36.3	34.5	30.1	27.5
44	21644	37.2	18.5	15.9	15.1	26.0	25.8	25.2	21.1
45	32497	20.2	28.2	23.4	22.7	42.0	37.8	35.6	[illegible]
46	23261	30.6	20.8	19.5	20.3	31.1	29.2	29.3	[illegible]
153	26376	1.4	41.4	40.7	40.0	59.0	53.1	40.0	45.7

REGION -S.CEN. ATTACK 310 INTEGRATED DOSE INTERVAL=0-99

POPULATION ITEM	TOTALS	PROMPT	15 DEC 51	25 DEC 51	15 MAY 51	15 JUN 51	5 JUL 52	25 NOV 50	SIX WIND AVERAGE
1	429332	2.4	34.5	41.5	53.1	45.1	47.6	28.9	41.8
3	169520	24.8	16.5	22.7	27.7	18.2	25.3	18.7	21.5
6	114777	34.2	15.6	20.7	21.6	13.3	17.5	19.3	[illegible]
7	151832	2.6	20.9	26.6	47.4	32.1	48.6	20.4	32.7
10	202207	26.2	16.7	23.2	27.9	17.9	24.2	19.3	21.5
12	142979	20.2	16.2	22.7	29.7	20.8	30.4	17.2	22.6
24	44549	32.6	15.9	21.6	20.7	13.2	15.9	19.8	17.9
25	25801	29.2	16.2	21.6	23.4	15.3	19.8	13.9	19.2
74	98472	33.2	14.9	23.3	22.0	14.2	17.3	19.8	18.6
94	71366	32.7	9.0	21.8	12.1	8.7	12.9	18.2	15.8
135	321592	2.1	39.8	45.2	56.9	47.4	46.6	33.6	44.0
148	365893	3.0	31.8	32.5	49.1	38.6	45.1	30.1	37.9
149	205064	2.7	33.5	31.2	51.1	38.3	47.8	32.3	39.0
150	20712	5.3	20.1	20.2	44.6	26.4	37.2	19.6	26.0
151	22774	2.8	16.6	20.5	43.1	47.8	46.4	29.2	35.9
152	117907	3.1	33.7	39.5	47.9	40.5	41.5	28.6	36.6
159	133425	2.6	23.5	25.3	49.7	33.0	48.8	23.6	[illegible]
37	56573	26.1	16.6	22.6	26.4	17.5	23.9	19.1	[illegible]
38	53441	3.2	26.2	31.2	49.0	34.6	46.9	25.6	[illegible]
39	42628	24.6	16.3	22.2	27.0	17.0	23.7	19.1	[illegible]
40	41752	26.5	13.2	21.0	19.1	13.0	21.5	14.8	17.1
41	49790	29.8	12.2	21.1	19.4	15.6	20.8	16.8	17.7
42	42478	30.2	15.8	23.0	23.7	14.9	19.2	18.6	[illegible]
43	117375	27.8	17.0	22.4	26.1	17.0	22.6	19.8	[illegible]
44	21910	34.3	13.6	19.1	18.4	11.2	15.5	17.5	[illegible]
45	32287	23.9	16.3	21.5	27.7	13.0	27.0	20.1	[illegible]
46	26182	34.8	16.8	16.6	21.1	13.0	17.8	14.7	16.7
153	14690	2.7	27.0	33.6	46.0	35.2	43.1	23.4	34.8

POPULATION ITEM	TOTALS	REGION -MOUNT. PROMPT	15 DEC 51	25 DEC 51	ATTACK 310 15 MAY 51	15 JUN 51	INTEGRATED DOSE INTERVAL=0-999 5 JUL 52	25 NOV 50	SIX WIND AVERAGE
1	856956	1.2	68.2	56.4	72.4	71.9	67.3	65.0	66.8
3	68547	17.3	54.9	46.0	37.9	31.7	45.7	43.9	43.3
6	46012	24.1	48.0	40.2	27.0	20.3	38.4	35.3	34.9
7	57070	1.9	67.0	62.3	67.0	56.0	67.3	62.6	63.7
10	87708	16.6	56.5	45.4	37.6	32.0	46.0	44.0	43.6
12	52764	19.0	53.3	48.3	40.5	33.7	46.8	44.8	44.6
24	23418	21.9	50.0	42.7	30.5	24.3	39.2	38.3	37.5
25	12139	20.1	51.6	43.8	34.1	27.3	42.2	40.8	39.9
74	35254	27.9	43.2	40.2	31.8	25.0	36.9	36.2	35.5
94	20764	26.8	50.8	42.1	23.3	14.2	39.2	32.4	33.7
135	413186	1.7	67.8	55.0	67.0	65.2	67.7	61.3	64.0
148	235616	2.7	61.6	55.5	59.8	48.8	60.6	55.6	57.0
149	98287	3.2	58.5	46.5	61.8	41.5	51.8	50.3	51.8
150	15279	3.2	64.8	63.7	56.1	44.9	66.2	59.8	59.3
151	4670	4.3	70.1	61.5	55.5	46.6	69.7	51.8	59.2
152	117207	2.2	63.4	61.7	58.7	55.5	66.8	59.6	60.9
159	50553	3.0	56.1	50.5	63.2	38.7	55.5	52.6	52.8
37	23309	18.6	53.1	45.8	37.0	29.9	44.8	42.8	42.2
38	22353	3.2	61.2	55.7	60.9	48.8	60.6	56.1	57.2
39	16373	16.7	54.0	45.1	36.1	30.7	43.5	43.4	42.1
40	16743	19.9	53.7	43.1	24.9	18.2	43.5	34.8	36.3
41	12762	25.4	50.3	44.9	32.6	22.8	43.6	43.1	39.6
42	16568	19.2	55.4	46.9	39.6	30.5	46.9	44.8	44.0
43	46771	20.1	51.2	44.1	36.0	28.2	44.2	42.1	41.0
44	9534	26.7	44.0	37.5	26.3	18.7	35.5	35.3	32.9
45	15536	17.2	57.4	48.2	38.1	35.2	48.3	45.5	45.5
46	16077	21.6	55.2	45.1	32.4	27.3	37.8	37.0	39.1
153	10596	1.8	63.2	62.0	64.9	56.6	69.0	61.2	63.2

POPULATION ITEM	TOTALS	REGION -N.WEST PROMPT	15 DEC 51	25 DEC 51	ATTACK 310 15 MAY 51	15 JUN 51	INTEGRATED DOSE INTERVAL=0-999 5 JUL 52	25 NOV 50	SIX WIND AVERAGE
1	162957	2.4	64.2	71.0	63.8	56.5	64.4	69.4	64.9
3	46222	34.7	44.2	46.7	29.1	32.2	36.4	45.9	39.1
6	30440	46.8	34.2	36.6	19.1	22.2	25.8	34.2	28.7
7	30091	5.2	57.2	70.9	52.2	49.2	65.3	69.2	60.7
10	50088	32.8	44.2	48.1	28.5	31.7	36.2	45.3	39.0
12	46262	38.8	43.9	43.8	29.6	32.2	36.1	44.7	38.4
24	18408	41.9	35.4	41.5	21.3	24.9	27.8	38.3	31.5
25	9248	38.9	40.4	43.7	25.7	29.1	32.5	42.4	35.6
74	24168	50.8	33.3	33.7	22.0	23.7	27.5	34.9	29.2
94	32311	44.1	43.4	42.9	29.8	32.8	34.8	40.6	37.4
135	62429	2.4	53.7	67.9	50.9	45.3	58.2	68.0	57.3
148	98111	4.2	46.1	70.2	44.1	36.7	60.4	63.7	53.6
149	57546	3.7	39.4	67.2	40.4	29.5	55.3	61.4	48.9
150	11300	7.6	67.4	67.9	56.2	56.4	64.6	70.3	64.1
151	5946	8.4	57.7	68.7	47.1	49.3	65.7	74.5	60.5
152	23327	2.8	49.6	79.1	45.7	41.9	69.8	63.6	58.3
159	36570	4.4	48.1	73.8	49.2	40.4	64.1	65.6	56.9
37	16370	37.1	41.9	45.3	28.0	30.9	34.9	44.3	37.5
38	10772	5.4	48.7	66.1	45.1	41.1	60.3	63.8	54.2
39	10784	32.6	41.8	46.6	27.3	29.9	34.9	46.8	37.9
40	27160	34.1	49.5	53.9	33.9	40.2	40.0	47.6	44.2
41	12484	37.6	39.6	39.7	25.2	26.6	31.6	46.0	34.6
42	12767	43.7	35.5	39.1	21.6	24.2	28.0	37.4	31.0
43	32594	40.3	39.2	42.8	24.6	27.9	32.4	40.9	34.6
44	6889	50.8	32.1	35.0	17.7	21.5	24.6	31.8	27.1
45	10321	33.3	44.4	47.1	31.9	33.8	37.1	50.1	40.8
46	6344	39.3	43.7	42.5	28.4	30.9	34.7	44.0	37.4
153	2504	3.5	58.7	73.9	54.4	50.8	65.9	68.0	62.0

U. S. TOTALS — ATTACK 310 — INTEGRATED DOSE INTERVAL=0-2999

POPULATION ITEM	TOTALS	PROMPT	15 DEC 51	25 DEC 51	15 MAY 51	15 JUN 51	5 JUL 52	25 NOV 50	SIX WIND AVERAGE
1	2971499	2.2	77.2	75.4	73.1	74.9	74.7	72.1	74.6
3	1784655	24.4	48.9	53.3	42.9	45.2	43.2	44.6	46.3
6	1246526	32.6	41.2	47.2	34.3	36.5	33.2	37.2	38.3
7	1343059	2.1	69.2	68.3	64.6	71.0	74.7	65.0	68.8
10	2019872	24.0	49.7	53.2	42.7	45.3	43.7	44.7	46.5
12	1653024	23.8	49.6	54.4	44.8	46.9	44.5	45.7	47.6
24	675084	29.1	41.8	48.7	35.1	36.2	33.5	37.4	38.8
25	329959	27.6	44.9	50.7	38.8	40.4	37.8	40.8	42.2
74	**1103668**	**41.4**	**37.0**	**43.1**	**29.8**	**34.2**	**30.1**	**33.4**	**34.6**
94	1367922	30.9	42.9	48.7	37.5	40.6	37.0	36.5	40.5
135	1750307	2.0	76.9	74.8	70.5	73.8	74.5	71.7	73.7
148	3039695	3.0	70.7	67.8	61.7	68.5	72.2	65.0	67.6
149	1331375	3.5	68.4	64.5	59.4	65.4	69.9	62.4	65.0
150	401179	3.5	68.3	73.2	66.4	66.1	72.0	59.7	67.6
151	225141	3.4	64.2	66.4	61.9	65.9	68.1	62.7	64.9
152	1076563	2.1	75.5	69.9	63.1	73.6	75.8	71.2	71.5
159	1961169	2.7	68.3	61.6	59.7	67.3	70.6	60.8	64.7
37	642352	25.7	47.5	52.7	41.6	44.0	41.7	43.3	45.1
38	424202	3.2	67.6	67.3	62.0	68.2	71.5	63.0	66.6
39	379219	23.1	49.5	54.0	43.0	45.4	43.3	46.2	46.9
40	982094	25.1	46.8	51.0	41.9	43.7	40.4	41.0	44.1
41	765932	25.7	44.8	55.0	41.4	44.0	42.0	42.2	44.9
42	443688	28.6	46.1	51.1	38.3	41.1	38.1	41.6	42.7
43	1174589	26.8	47.1	51.9	40.3	42.9	40.5	42.9	44.3
44	268623	33.1	39.4	47.4	32.6	34.9	32.0	37.2	37.3
45	337926	23.0	50.9	54.2	44.7	46.7	45.8	45.9	48.0
46	317218	33.8	42.0	46.6	34.5	35.9	33.9	36.8	38.3
153	92303	2.0	74.5	72.2	67.5	72.1	74.2	69.3	71.6

REGION -N.EAST — ATTACK 310 — INTEGRATED DOSE INTERVAL=0-2999

POPULATION ITEM	TOTALS	PROMPT	15 DEC 51	25 DEC 51	15 MAY 51	15 JUN 51	5 JUL 52	25 NOV 50	SIX WIND AVERAGE
1	163593	3.5	76.2	78.9	76.7	69.4	70.7	45.1	69.5
3	446779	29.7	24.6	49.8	39.2	29.9	26.8	32.6	32.8
6	357939	35.3	17.2	45.0	32.6	22.9	19.7	30.3	27.9
7	91118	3.3	68.0	72.9	72.2	66.7	67.6	33.7	63.5
10	465707	28.2	25.5	49.8	40.8	31.0	27.8	33.8	34.8
12	449968	30.6	26.1	51.0	39.6	30.4	27.7	31.4	34.4
24	204904	29.2	16.7	47.8	35.1	23.4	19.8	33.1	29.3
25	93456	30.6	20.5	48.5	36.6	26.4	23.2	32.1	31.2
74	**384765**	**58.3**	**10.2**	**32.3**	**18.8**	**13.1**	**12.9**	**21.2**	**18.1**
94	452761	35.2	21.5	46.4	38.4	29.1	26.5	28.6	31.7
135	56329	2.8	75.8	77.6	74.8	70.0	71.0	36.0	67.5
148	229209	4.6	58.7	69.0	68.0	60.5	61.7	33.7	58.6
149	66431	7.1	48.1	58.2	60.6	57.8	54.8	37.3	52.8
150	96556	2.9	70.4	77.7	74.2	66.6	69.9	29.8	64.8
151	40137	5.1	48.0	67.0	62.9	51.6	55.4	40.5	54.7
152	26105	3.6	59.0	67.4	71.9	58.7	58.6	28.3	57.3
159	164942	5.1	56.8	65.6	63.7	62.8	61.3	35.0	57.5
37	170972	30.9	22.8	49.8	38.0	28.3	25.6	31.4	32.7
38	34351	5.6	57.1	68.8	66.0	59.3	60.8	33.6	57.6
39	87191	26.3	24.0	51.4	40.7	30.0	27.1	34.4	34.6
40	305811	25.3	25.3	51.7	45.1	36.4	30.9	37.5	37.8
41	265616	32.3	21.7	51.9	37.6	25.8	25.5	26.5	31.5
42	118945	33.2	21.3	47.2	34.1	25.7	22.6	32.2	30.5
43	297900	32.1	21.7	48.7	35.8	26.3	23.7	31.5	31.3
44	86053	37.9	13.5	45.1	28.1	18.5	17.1	29.7	25.3
45	82973	27.1	28.0	51.5	42.7	32.3	28.9	32.0	35.9
46	77800	33.7	21.5	48.0	35.1	24.9	22.2	28.7	30.1
153	5010	2.5	72.5	76.1	74.1	67.7	69.2	31.8	65.2

REGION -S.EAST ATTACK 310 INTEGRATED DOSE INTERVAL=0-2999

POPULATION ITEM	TOTALS	PROMPT	15 DEC 51	25 DEC 51	15 MAY 51	15 JUN 51	5 JUL 52	25 NOV 50	SIX WIND AVERAGE
1	447603	2.3	68.5	68.0	64.5	74.8	75.2	66.2	69.6
3	380213	20.3	56.2	58.2	47.1	59.5	51.3	56.8	54.9
6	206811	32.8	49.0	50.1	36.5	49.9	36.7	49.5	45.3
7	440215	1.9	62.6	64.9	62.5	74.2	75.4	62.1	67.0
10	439169	21.0	55.5	57.2	45.4	57.4	49.8	55.1	53.4
12	315169	17.7	59.3	60.9	50.6	64.4	53.9	60.4	58.3
24	93789	32.7	48.7	49.7	33.7	44.9	34.8	46.3	43.0
25	55109	26.3	52.7	54.6	41.4	53.5	43.4	53.1	49.8
74	152237	32.9	47.5	50.1	40.1	51.6	38.6	50.0	46.3
94	195435	25.2	49.7	56.7	41.9	58.1	51.2	54.2	52.0
135	236925	1.7	67.8	65.8	64.7	74.0	75.4	65.1	68.8
148	528412	2.6	66.7	62.8	60.8	69.7	70.6	59.8	65.1
149	293619	2.7	63.4	60.3	59.3	66.8	68.9	56.2	62.5
150	53851	4.1	68.4	67.7	61.7	67.3	64.9	64.6	65.8
151	71310	1.7	77.9	67.0	65.8	73.4	74.2	67.5	71.0
152	103448	1.8	65.7	62.5	64.6	74.6	74.0	66.0	67.9
159	778310	2.6	65.2	59.6	55.8	69.6	68.9	57.2	62.7
37	128971	21.8	55.3	57.4	45.9	58.9	50.5	56.2	54.1
38	120665	2.6	63.7	63.2	60.3	72.1	71.9	59.9	65.2
39	87450	20.3	57.4	59.0	47.1	60.3	49.9	58.4	55.3
40	122760	20.3	54.2	59.2	46.8	59.5	52.4	57.4	54.9
41	183746	15.2	59.1	63.9	52.4	68.3	63.9	64.8	62.1
42	81201	26.8	52.9	55.0	42.4	53.5	43.1	53.0	50.0
43	227604	23.5	55.2	56.6	44.1	57.4	46.9	55.5	52.6
44	45079	30.6	52.2	53.0	36.0	50.6	37.1	51.4	46.7
45	66285	20.8	55.9	57.8	46.1	59.9	52.6	57.1	54.9
46	77608	42.8	40.1	39.8	28.3	36.5	29.2	37.5	35.2
153	13755	1.8	70.2	65.6	68.7	74.7	75.5	67.8	70.4

REGION -E.N.C. ATTACK 310 INTEGRATED DOSE INTERVAL=0-2999

POPULATION ITEM	TOTALS	PROMPT	15 DEC 51	25 DEC 51	15 MAY 51	15 JUN 51	5 JUL 52	25 NOV 50	SIX WIND AVERAGE
1	244811	1.9	77.8	69.2	73.8	67.6	73.9	68.3	71.8
3	362252	19.5	69.9	58.5	45.6	55.8	51.8	43.1	54.1
6	264368	25.6	67.5	57.0	37.2	52.9	45.2	34.7	49.1
7	256227	1.4	76.0	64.8	70.5	68.5	76.0	71.0	71.1
10	424715	19.3	70.5	58.6	45.9	55.7	53.0	42.7	54.4
12	336007	19.1	69.1	58.2	46.9	56.4	51.8	46.1	54.7
24	157831	22.4	70.9	59.1	38.4	55.3	48.4	35.0	51.2
25	71985	21.2	70.2	58.5	42.1	55.6	49.7	39.4	52.6
74	215192	28.9	64.4	57.0	29.5	55.4	39.2	31.0	46.1
94	407382	24.7	67.6	57.0	40.1	53.9	45.8	37.3	50.3
135	161541	1.4	76.4	63.2	71.2	68.3	76.9	71.0	71.1
148	520343	1.7	80.5	61.9	69.6	68.5	77.4	71.7	71.6
149	191030	2.2	81.6	51.8	64.8	66.1	75.5	67.1	67.8
150	106538	1.3	74.3	77.1	74.9	71.1	80.2	75.1	75.5
151	26556	1.2	70.5	68.8	70.0	68.6	71.3	73.1	70.4
152	196279	1.4	84.2	62.5	71.3	69.4	78.5	74.1	73.3
159	423744	1.6	79.9	55.4	68.0	63.9	73.3	68.3	68.1
37	132985	20.2	70.0	58.5	44.0	55.9	50.5	42.0	53.5
38	67174	2.0	77.3	66.1	70.0	68.0	75.9	70.1	71.2 -
39	65183	17.7	72.0	59.8	46.1	56.9	54.2	44.3	55.5
40	325222	21.6	69.4	56.3	43.9	53.5	48.9	40.5	52.1 -
41	141252	19.7	71.1	62.1	43.1	56.3	47.8	42.2	53.8
42	88648	21.0	70.0	59.0	40.2	55.3	47.9	39.0	51.9
43	235700	20.8	69.4	58.0	43.1	55.9	50.4	41.5	53.1
44	48377	23.9	69.1	57.6	35.1	55.7	45.9	35.4	49.8
45	66371	17.2	72.2	57.9	49.6	58.5	56.7	45.1	56.7
46	50521	23.5	68.8	57.8	38.4	54.4	48.2	37.7	50.9
153	13672	1.2	77.5	70.2	73.3	70.6	79.8	73.6	74.2

REGION -W.N.C. ATTACK 310 INTEGRATED DOSE INTERVAL=0-2999

POPULATION ITEM	TOTALS	PROMPT	15 DEC 51	25 DEC 51	15 MAY 51	15 JUN 51	5 JUL 52	25 NOV 5[illegible]	SIX TIME AVERAGE
1	509674	2.0	72.2	68.5	61.9	71.3	73.2	69.7	69.5
3	153950	22.9	52.7	55.6	40.0	55.0	56.5	57.6	52.9
6	90463	36.4	42.3	46.6	28.5	43.1	44.0	48.0	42.1
7	282916	1.5	70.4	70.8	57.9	75.5	78.9	72.7	71.9
10	175861	23.2	52.0	55.5	39.3	55.0	56.5	57.7	52.7
12	172061	21.3	54.5	56.6	42.2	57.6	59.2	59.1	54.9
24	44979	32.1	46.2	50.6	30.1	44.6	45.8	50.8	44.7
25	25952	28.2	48.9	52.3	34.9	49.6	50.8	53.7	47.4
74	92623	35.5	45.1	45.1	32.2	45.9	46.5	47.1	43.6
94	86723	41.3	37.4	41.4	23.2	39.5	40.8	45.1	37.9
135	440663	2.0	71.8	69.8	61.1	73.0	73.4	68.2	69.5
148	779900	1.5	74.7	70.8	57.0	78.7	80.5	72.2	72.3
149	247491	2.3	74.2	67.0	54.3	75.8	78.0	67.9	69.5
150	64587	1.2	64.9	79.5	66.1	73.7	82.4	74.7	73.5
151	32569	0.8	67.9	79.3	63.4	81.2	85.0	75.2	75.3
152	435310	1.3	77.0	71.0	56.7	80.9	81.4	74.0	73.5
159	263030	1.8	70.2	66.3	54.1	76.1	78.5	72.1	69.5
37	55582	24.7	51.6	54.4	38.8	53.8	55.3	56.3	51.7
38	89565	1.5	71.2	70.8	58.5	76.8	79.9	72.6	71.6
39	31439	22.2	52.7	56.0	39.9	54.7	56.3	58.1	53.2
40	51123	34.0	41.0	45.6	26.5	42.6	44.0	52.1	42.0
41	52455	31.7	44.9	52.0	31.5	46.6	48.8	52.0	45.9
42	41699	31.4	46.7	48.8	32.6	46.6	47.8	59.6	45.5
43	108469	25.7	50.9	54.2	38.3	52.8	54.1	54.7	[illegible]
44	21644	37.2	42.2	45.2	28.7	42.4	43.3	46.2	41.3
45	32497	20.2	56.9	58.2	42.3	58.7	59.4	61.4	56.1
46	23281	30.6	46.7	48.7	33.7	48.3	48.9	51.3	46.3
153	28376	1.4	72.6	70.8	60.7	76.6	77.0	72.2	71.7

REGION -S.CEN. ATTACK 310 INTEGRATED DOSE INTERVAL=0-2999

POPULATION ITEM	TOTALS	PROMPT	15 DEC 51	25 DEC 51	15 MAY 51	15 JUN 51	5 JUL 52	25 NOV 5[illegible]	SIX TIME AVERAGE
1	429332	2.4	79.1	79.1	75.9	71.1	67.3	67.4	73.5
3	169520	24.8	58.8	53.6	45.5	42.0	44.0	43.7	48.0
6	114777	34.2	53.7	47.2	36.3	34.2	36.1	38.4	41.0
7	151632	2.6	70.2	67.8	69.8	61.9	65.5	56.7	65.5
10	202207	26.2	57.5	52.7	44.6	41.4	43.0	43.3	47.1
12	142979	20.2	62.3	56.9	50.4	45.6	48.6	45.8	51.6
24	44549	32.6	55.2	47.4	35.2	34.6	36.5	39.0	41.3
25	25801	29.2	57.0	50.3	39.7	37.5	39.4	41.0	44.1
74	98472	33.2	55.5	47.2	36.0	36.8	37.9	39.7	42.2
94	71366	32.7	56.5	43.4	27.5	34.3	31.5	34.8	38.0
135	321592	2.1	81.2	81.2	78.9	73.2	66.9	71.2	75.4
148	365893	3.0	73.4	72.7	73.6	66.3	63.2	64.8	69.3
149	205064	2.7	71.6	72.6	74.7	66.7	65.2	64.1	69.1
150	20712	5.3	73.3	60.5	64.1	59.2	55.5	56.0	61.4
151	22774	2.8	58.6	56.0	76.6	74.2	61.2	67.3	65.6
152	117907	3.1	79.4	78.3	72.9	65.5	61.6	67.2	70.5
159	133425	2.6	68.6	65.6	72.5	63.4	60.9	59.1	66.0
37	56573	26.1	58.5	52.4	43.7	40.9	43.1	43.2	47.0
38	53441	3.2	71.3	70.1	71.1	64.0	64.7	61.7	67.1
39	42628	24.6	59.1	53.8	44.3	41.0	44.0	44.2	47.7
40	41752	26.5	61.5	47.1	36.5	39.5	39.6	36.5	43.4
41	49790	29.8	53.9	47.4	36.1	37.9	37.9	38.2	41.9
42	42478	30.2	56.1	50.0	39.6	38.0	38.6	40.1	43.7
43	117375	27.8	57.6	51.6	42.4	39.7	42.1	42.3	[illegible]
44	21910	34.3	54.2	44.4	32.9	30.8	36.9	35.3	37.1
45	32287	23.9	59.4	55.0	45.8	41.6	46.1	45.9	49.0
46	28162	34.8	54.0	48.5	38.7	30.0	35.3	37.3	40.6
153	14690	2.7	77.9	73.2	70.7	63.6	61.2	63.1	68.3

REGION -MOUNT. ATTACK 310 INTEGRATED DOSE INTERVAL=0-2999

POPULATION ITEM	TOTALS	PROMPT	15 DEC 51	25 DEC 51	15 MAY 51	15 JUN 51	5 JUL 52	25 NOV 50	SIX WIND AVERAGE
1	856956	1.2	88.2	83.9	84.6	85.1	83.6	84.0	84.9
3	66547	17.3	66.3	63.7	55.5	48.4	57.3	57.1	58.1
6	46012	24.1	57.2	55.8	46.2	36.8	48.6	47.4	48.7
7	57070	1.9	88.3	85.8	79.0	80.3	82.1	83.6	83.2
10	67708	16.6	67.4	64.9	55.6	48.5	58.2	57.6	58.7
12	52764	19.0	65.4	62.6	57.1	50.3	58.2	57.7	58.5
24	23418	21.9	60.9	59.2	49.6	40.2	49.5	49.5	51.5
25	12139	20.1	62.9	60.7	52.2	43.7	53.2	52.7	54.3
74	35254	27.9	54.5	53.1	46.6	40.0	47.2	46.6	48.0
94	20764	26.8	57.4	56.4	41.1	35.0	52.9	48.2	48.5
135	413186	1.7	87.1	84.4	79.9	81.2	82.7	83.6	83.1
148	235616	2.7	80.5	78.3	70.9	72.9	74.6	75.0	75.4
149	98287	3.2	76.2	71.6	71.5	68.9	69.9	69.8	71.3
150	15279	3.2	85.6	82.3	67.7	72.6	77.0	79.0	77.4
151	4870	4.3	84.5	80.8	63.1	72.3	77.2	75.5	75.6
152	117207	2.2	83.3	83.1	71.2	76.4	78.1	78.9	78.5
159	50553	3.0	71.9	68.4	72.1	69.9	71.4	68.1	70.3
37	23309	18.6	65.0	62.6	54.6	47.1	56.3	55.4	56.8
38	22353	3.2	80.5	77.9	72.5	72.9	74.9	76.2	75.8
39	18373	16.7	65.5	63.5	54.1	47.3	54.6	55.8	56.8
40	16743	19.9	60.7	57.2	48.2	34.1	54.4	52.2	51.1
41	12762	25.4	60.3	60.0	50.4	41.5	55.9	52.2	53.4
42	18568	19.2	66.8	65.3	57.7	49.1	59.6	56.0	59.1
43	46771	20.1	62.8	60.9	53.7	45.4	55.4	53.8	55.3
44	9534	26.7	52.9	52.1	43.5	34.5	45.2	44.3	45.4
45	15536	17.2	67.8	64.7	55.7	51.7	59.7	60.0	59.9
46	16077	21.6	65.0	61.4	48.9	45.6	53.9	50.0	54.1
153	10596	1.8	86.3	85.0	77.9	80.1	81.5	82.6	82.2

REGION -N.WEST ATTACK 310 INTEGRATED DOSE INTERVAL=0-2999

POPULATION ITEM	TOTALS	PROMPT	15 DEC 51	25 DEC 51	15 MAY 51	15 JUN 51	5 JUL 52	25 NOV 50	SIX WIND AVERAGE
1	162957	2.4	79.7	82.6	77.6	74.7	74.1	89.5	79.7
3	46222	34.7	56.4	60.3	45.4	53.5	54.5	58.2	54.7
6	30440	46.8	46.0	49.9	33.6	43.3	44.3	46.7	44.0
7	30091	5.2	72.9	82.0	67.1	63.6	77.1	81.6	74.1
10	50068	32.8	57.8	62.0	45.4	54.9	56.2	59.7	56.0
12	46262	38.8	53.7	57.1	45.0	50.3	51.0	54.2	51.9
24	18408	41.9	50.5	53.7	36.3	48.2	48.3	52.6	48.2
25	9248	38.9	53.1	56.6	41.3	50.4	51.0	54.9	51.2
74	24168	50.8	41.7	45.3	35.4	38.0	39.2	42.8	40.4
94	32311	44.1	52.2	53.9	43.0	49.0	49.2	50.5	49.6
135	62429	2.4	70.8	76.4	67.9	62.2	68.9	85.4	71.9
148	98111	4.2	63.9	81.1	60.4	53.8	75.4	80.9	69.3
149	57546	3.7	58.7	77.1	58.1	46.7	70.3	79.1	65.0
150	11300	7.6	78.4	86.4	71.0	72.7	83.4	87.0	79.8
151	5946	8.4	78.5	88.6	57.7	59.8	85.8	85.2	76.0
152	23327	2.8	66.1	86.6	61.7	60.8	81.6	81.6	73.1
159	36570	4.4	64.7	82.5	63.4	56.5	77.5	83.8	71.4
37	16370	37.1	54.2	58.0	43.7	51.6	52.4	56.2	52.7
38	10772	5.4	65.9	80.6	60.0	56.7	75.7	78.7	69.6
39	10784	32.6	55.4	60.7	45.5	53.4	53.8	60.8	54.9
40	27160	34.1	63.5	63.4	48.5	61.2	60.2	62.7	59.9
41	12484	37.6	49.5	53.9	39.4	53.4	49.4	56.4	50.3
42	12767	43.7	48.3	51.8	37.3	44.5	45.9	49.4	46.2
43	32594	40.3	51.2	55.4	40.7	47.9	49.5	52.3	49.5
44	6889	50.8	43.4	46.5	31.7	40.2	41.4	43.1	41.1
45	10321	33.3	58.0	62.3	48.7	53.3	55.8	60.5	56.4
46	8344	39.3	53.2	56.7	42.4	50.7	51.0	54.7	51.5
153	2504	3.5	75.7	84.2	69.9	69.6	78.5	86.3	77.4

POPULATION ITEM	U. S. TOTALS TOTALS	PROMPT	ATTACK 430 15 DEC 51	25 DEC 51	15 MAY 51	INTEGRATED DOSE INTERVAL=0-999 15 JUN 51	5 JUL 52	25 NOV 50	SIX WIND AVERAGE
1	2971499	2.5	40.5	41.5	51.9	51.8	50.6	44.3	46.7
3	1784656	26.8	14.1	17.1	22.8	24.3	24.3	21.5	20.7
6	1246526	36.5	12.1	12.9	17.5	19.1	18.6	17.2	16.2
7	1343059	2.0	20.5	28.8	37.9	40.7	42.8	33.9	34.1
10	2019872	25.8	14.3	17.3	23.2	24.6	24.8	21.8	21.0
12	1653024	26.8	15.1	17.2	23.0	25.5	24.5	21.9	21.2
24	675084	34.5	11.1	12.9	15.5	17.5	16.2	16.7	15.0
25	329959	31.5	12.9	14.7	18.8	21.0	20.1	19.2	17.8
74	1103668	48.1	11.6	11.8	16.5	17.7	17.1	15.9	15.1
94	1387922	35.9	8.9	11.2	15.1	19.0	18.6	17.2	15.0
135	1750307	3.0	38.1	39.2	49.3	49.5	46.7	39.6	43.7
148	3039695	2.7	28.7	29.6	36.3	42.9	42.7	33.5	35.6
149	1331375	3.0	30.0	30.1	38.8	43.4	44.8	33.4	36.8
150	401179	2.5	16.7	24.6	30.7	34.4	34.5	36.3	29.5
151	225141	2.5	18.4	28.1	33.7	36.7	36.9	34.4	31.4
152	1076563	2.4	33.7	31.5	35.3	46.6	44.0	32.6	37.3
159	1961169	1.9	23.3	27.4	35.4	42.0	45.3	31.7	34.2
37	642352	28.9	13.5	16.2	21.5	23.6	23.3	21.0	19.8
38	424202	3.0	23.1	29.1	37.5	40.0	41.1	32.9	33.9
39	379219	24.5	15.4	18.6	24.0	25.3	24.7	22.9	21.8
40	982094	30.6	10.2	11.5	15.2	19.5	18.5	18.1	15.5
41	765932	29.1	8.9	15.2	20.3	23.3	23.7	21.0	18.7
42	443688	32.4	13.6	15.4	20.3	21.1	21.3	19.5	18.5
43	1174589	30.0	14.4	16.4	21.5	23.6	23.1	20.7	19.9
44	268623	38.3	12.1	12.5	16.7	18.8	17.8	17.4	15.9
45	337926	24.5	15.3	17.5	24.0	25.7	25.9	23.0	21.9
46	317218	35.3	13.5	14.4	20.5	22.2	21.4	18.6	18.4
153	92303	2.4	28.5	32.5	40.9	42.5	43.3	34.6	37.1

POPULATION ITEM	REGION -N.EAST TOTALS	PROMPT	ATTACK 430 15 DEC 51	25 DEC 51	15 MAY 51	INTEGRATED DOSE INTERVAL=0-999 15 JUN 51	5 JUL 52	25 NOV 50	SIX WIND AVERAGE
1	163593	2.6	0.	23.2	49.6	52.2	50.4	22.5	33.0
3	446779	34.4	0.	2.0	13.9	14.6	11.9	9.2	8.6
6	357939	41.3	0.	1.0	10.6	10.9	7.7	7.5	6.3
7	91118	2.6	0.	9.3	31.4	37.5	38.4	10.5	21.2
10	465707	32.1	0.	2.3	14.7	15.4	12.3	10.1	9.1
12	449988	35.5	0.	2.0	15.0	16.1	12.7	9.2	9.2
24	204904	33.9	0.	0.8	11.2	10.7	7.1	7.6	6.2
25	93456	35.5	0.	1.3	12.6	12.6	9.6	8.3	7.4
74	384765	67.2	0.	0.6	6.1	6.5	5.3	4.7	3.9
94	452781	38.6	0.	1.2	12.5	13.9	9.8	7.9	7.6
135	56329	2.0	0.	13.7	40.7	46.5	42.6	12.5	26.0
148	229209	3.5	0.	9.5	31.3	35.2	35.4	13.9	20.9
149	66431	5.4	0.	10.4	22.9	26.2	28.0	20.8	18.1
150	96556	2.1	0.	9.7	39.8	45.3	40.0	7.4	23.7
151	40137	4.2	0.	10.2	29.5	29.5	33.1	22.2	20.8
152	26105	2.7	0.	5.6	24.0	29.1	40.7	7.5	17.8
159	164942	3.2	0.	11.0	25.2	29.5	34.7	19.0	19.9
37	170972	36.0	0.	1.6	13.4	13.9	11.2	8.6	8.1
38	34351	5.3	0.	7.9	29.4	33.1	32.0	11.8	19.0
39	67191	30.1	0.	1.9	15.1	14.9	11.8	10.5	9.1
40	305611	29.4	0.	0.9	14.6	15.8	11.0	10.8	8.8
41	265616	37.4	0.	2.0	12.9	12.9	12.2	6.1	7.7
42	118945	39.3	0.	1.5	11.1	12.2	10.1	8.3	7.2
43	297900	38.1	0.	1.6	12.7	13.3	10.5	8.3	7.7
44	86053	44.9	0.	0.7	9.0	8.7	6.3	7.8	5.4
45	82973	30.8	0.	2.2	16.4	16.7	13.1	9.2	9.6
46	77800	38.9	0.	1.9	14.0	14.0	12.3	7.5	8.3
153	5010	1.9	0.	10.1	37.2	43.8	41.6	8.2	23.5

REGION -S.EAST ATTACK 430 INTEGRATED DOSE INTERVAL=0-999

POPULATION ITEM	TOTALS	PROMPT	15 DEC 51	25 DEC 51	15 MAY 51	15 JUN 51	5 JUL 52	25 NOV 50	SIX WIND AVERAGE
1	447603	1.1	13.7	36.7	52.5	41.4	51.5	30.4	37.7
3	380213	15.6	11.7	28.5	42.0	34.9	36.8	27.8	30.3
6	206611	25.9	13.2	22.4	36.6	31.2	30.9	22.7	26.2
7	440215	0.9	7.0	33.9	50.7	40.6	48.6	34.6	35.9
10	439169	15.6	11.1	27.2	41.9	34.7	37.4	26.7	29.8
12	315169	14.2	15.5	31.2	43.3	36.0	35.7	28.0	31.6
24	95789	29.3	11.0	22.1	32.3	26.8	26.0	22.0	23.4
25	55109	22.0	12.1	25.9	37.1	31.5	31.4	25.8	27.3
74	152237	24.7	11.7	23.0	37.7	30.0	28.5	24.2	25.9
94	195435	16.2	7.1	28.9	41.7	37.7	37.8	34.7	31.3
135	230925	0.8	12.7	33.7	54.1	38.8	51.0	30.5	36.8
148	526412	1.1	15.6	31.8	50.6	40.1	47.5	29.4	35.8
149	293619	1.1	18.6	31.4	50.4	43.3	49.7	27.6	36.8
150	53851	1.9	10.7	32.5	44.1	27.9	36.2	32.9	30.7
151	71310	0.8	16.2	34.6	46.5	39.4	46.9	35.2	36.5
152	103448	1.0	10.1	32.4	54.2	34.3	44.4	30.7	34.3
159	778310	1.0	16.5	33.9	47.8	43.8	52.1	28.8	37.2
37	128971	17.2	11.5	28.0	40.6	35.2	36.6	28.7	30.1
38	120665	1.3	11.9	33.4	49.5	41.0	47.8	30.8	35.7
39	87450	15.7	14.9	28.8	40.7	36.9	36.4	28.8	31.1
40	122760	17.0	9.3	29.2	42.0	34.9	36.4	29.6	30.2
41	163746	9.9	8.2	31.3	41.6	44.1	44.4	41.6	35.2
42	81201	21.7	11.2	24.7	38.1	28.7	31.0	25.5	26.5
43	227604	18.2	13.1	27.6	40.2	34.4	34.9	26.9	29.5
44	45079	24.9	13.9	24.4	34.6	31.9	30.7	23.7	26.5
45	66285	16.2	11.0	28.5	41.4	35.5	37.3	28.7	30.4
46	77608	38.3	8.3	16.8	29.5	23.1	25.0	17.1	20.0
153	13755	0.9	12.2	32.0	57.5	34.5	47.6	31.2	35.8

REGION -E.N.C. ATTACK 430 INTEGRATED DOSE INTERVAL=0-999

POPULATION ITEM	TOTALS	PROMPT	15 DEC 51	25 DEC 51	15 MAY 51	15 JUN 51	5 JUL 52	25 NOV 50	SIX WIND AVERAGE
1	244811	1.2	39.1	20.8	18.6	37.1	37.2	51.5	34.0
3	362252	31.1	16.2	12.4	6.9	18.9	19.4	21.6	15.9
6	264368	41.6	12.2	11.4	4.4	14.5	15.4	15.4	12.2
7	256227	0.7	30.2	17.3	15.6	34.2	36.0	47.0	30.0
10	424715	30.3	15.7	12.2	6.4	19.0	19.3	21.3	15.7
12	336007	30.0	18.4	13.0	8.3	20.6	21.5	24.8	17.8
24	157831	39.0	11.9	12.9	4.4	13.8	14.3	14.4	12.0
25	71985	35.2	14.3	12.4	5.7	16.6	17.1	18.4	14.1
74	215192	51.2	11.5	11.4	4.7	13.1	14.0	15.7	11.7
94	407362	38.7	12.2	9.9	4.2	15.6	16.1	17.3	12.6
135	161541	0.6	33.8	17.8	16.8	34.7	38.9	45.4	31.2
148	520343	1.0	36.2	17.3	14.1	32.4	39.5	43.9	30.6
149	191030	1.7	42.4	13.1	16.2	39.0	44.7	36.8	32.0
150	106538	0.6	19.8	18.8	10.8	22.1	29.0	62.9	27.2
151	26556	0.6	26.5	19.1	18.8	35.6	29.3	50.2	29.9
152	196279	0.6	40.3	20.2	13.3	31.2	41.5	39.7	31.0
159	423744	0.8	37.1	13.0	16.9	36.4	38.8	39.2	30.2
37	132985	33.2	15.7	12.3	6.4	18.1	18.8	21.0	15.4
38	67174	1.8	30.2	17.9	14.4	29.6	34.8	47.3	29.0
39	65183	29.0	16.6	13.7	7.4	19.1	19.3	21.8	16.3
40	325222	33.3	14.0	9.8	4.9	17.1	18.0	18.2	13.7
41	141252	34.9	13.4	13.6	6.3	16.3	15.3	21.5	14.4
42	88648	37.2	15.5	13.3	6.4	16.0	17.4	18.4	14.5
43	235700	34.0	16.0	12.5	6.5	18.5	19.1	21.0	15.6
44	48377	43.1	13.5	12.5	4.4	14.8	15.4	16.1	12.8
45	66371	27.0	18.3	12.1	8.4	19.3	22.0	22.5	17.1
46	50521	38.5	14.6	10.9	5.8	18.9	17.1	16.7	14.0
153	13672	0.6	29.2	19.9	13.6	28.0	35.9	50.9	29.6

REGION -W.N.C. ATTACK 430 INTEGRATED DOSE INTERVAL=0-999

POPULATION ITEM	TOTALS	PROMPT	15 DEC 51	25 DEC 51	15 MAY 51	15 JUN 51	5 JUL 52	25 NOV 50	SIX WIND AVERAGE
1	509674	5.6	25.9	23.8	41.6	42.2	34.2	30.5	33.0
3	153950	23.7	17.7	17.0	19.8	34.1	27.5	18.8	22.5
6	90463	36.3	14.5	10.9	12.6	26.5	22.9	13.7	16.9
7	282916	3.8	23.1	25.0	31.9	49.0	36.5	25.4	31.8
10	175861	24.0	17.5	16.0	19.5	32.9	26.6	19.0	21.9
12	172061	22.1	18.4	18.3	21.0	37.5	30.1	19.5	24.1
24	44979	33.6	14.9	11.2	12.3	26.8	23.6	14.3	17.2
25	25952	28.9	16.4	14.2	16.0	30.7	25.9	16.4	19.9
74	92623	35.8	15.7	13.5	16.5	30.5	25.7	13.8	19.3
94	66723	44.3	13.0	9.8	7.5	23.6	22.7	10.8	14.6
135	440663	5.9	23.0	24.0	40.0	44.4	36.3	26.5	32.4
148	779900	3.7	24.8	24.4	30.6	53.5	42.2	22.3	33.0
149	247491	5.7	19.1	20.1	29.7	52.4	42.0	22.2	30.9
150	64587	2.8	15.5	26.7	33.9	42.0	33.0	31.1	30.4
151	32569	2.0	25.4	30.0	34.3	58.0	35.3	25.0	34.7
152	435310	2.9	29.5	26.0	30.4	55.4	44.1	20.6	34.4
159	263030	4.6	16.4	24.0	22.5	53.7	39.3	22.6	29.7
37	55582	25.4	17.4	16.2	19.0	33.8	27.8	17.8	22.0
38	89565	3.9	23.2	24.2	32.9	49.9	37.8	25.1	32.2
39	31439	22.5	16.5	16.6	19.3	33.5	28.4	18.7	22.1
40	51123	38.0	13.1	12.2	7.1	24.0	23.0	13.4	15.5
41	52455	32.8	14.4	15.1	12.7	28.5	24.6	14.1	18.2
42	41699	31.0	14.9	13.3	17.1	29.4	23.8	16.5	19.2
43	108469	25.9	17.3	16.0	19.0	33.7	27.6	16.8	21.7
44	21644	35.0	15.4	10.6	12.6	28.4	24.3	12.9	17.4
45	32497	20.5	19.3	16.4	20.4	36.4	30.7	21.1	24.1
46	23281	30.0	16.0	13.1	17.2	30.7	25.1	17.3	19.9
153	28376	3.6	24.2	25.9	36.9	49.2	39.1	24.5	33.3

REGION -S.CEN. ATTACK 430 INTEGRATED DOSE INTERVAL=0-999

POPULATION ITEM	TOTALS	PROMPT	15 DEC 51	25 DEC 51	15 MAY 51	15 JUN 51	5 JUL 52	25 NOV 50	SIX WIND AVERAGE
1	429332	1.8	37.9	44.6	53.3	47.1	44.2	30.5	42.9
3	169520	23.0	20.6	23.9	32.1	20.8	33.0	17.1	24.6
6	114777	32.3	20.5	22.4	29.1	19.6	29.6	17.3	23.1
7	151832	2.2	23.0	29.9	45.5	28.1	44.5	18.9	31.7
10	202207	24.5	20.9	23.8	33.5	20.7	33.9	17.2	25.0
12	142979	18.2	20.3	25.7	30.3	22.1	32.1	17.2	24.6
24	44549	32.2	18.9	22.0	27.5	18.9	27.9	15.9	21.9
25	25801	27.9	19.9	23.1	29.1	20.0	29.6	16.4	23.0
74	98472	34.5	18.6	23.2	26.8	19.1	24.9	14.8	21.2
94	71366	33.0	14.1	14.6	18.5	10.1	27.4	8.5	15.5
135	321592	1.4	45.1	50.8	60.4	55.3	45.6	33.7	48.5
148	365893	2.0	33.4	37.2	53.2	38.2	46.0	26.1	39.0
149	205064	1.5	34.2	32.1	60.0	36.3	52.4	24.8	40.0
150	20712	4.8	22.2	33.3	32.1	26.5	31.5	22.8	28.1
151	22774	3.2	12.8	25.5	25.9	17.2	33.8	36.3	25.3
152	117907	2.1	37.7	49.2	50.5	47.7	40.0	26.8	42.0
159	133425	1.9	24.4	21.8	48.7	25.7	46.5	20.0	31.2
37	56573	24.7	20.3	24.0	30.6	20.8	31.4	17.4	24.1
38	53441	2.8	27.9	33.9	49.5	33.0	44.4	23.8	35.4
39	42628	23.3	20.3	23.5	31.5	20.5	32.1	17.5	24.2
40	41752	29.2	16.9	16.8	17.7	11.6	21.7	11.4	16.0
41	49790	25.4	16.3	20.6	26.1	15.6	32.9	12.7	20.7
42	42478	30.0	19.0	23.3	28.1	18.9	28.1	14.7	22.0
43	117375	26.7	21.0	24.2	30.7	21.2	31.1	18.0	24.4
44	21910	35.9	16.6	20.3	23.9	16.6	24.3	16.1	19.6
45	32287	20.1	20.7	24.2	34.2	20.5	35.3	20.2	25.8
46	28182	29.9	19.2	26.0	26.7	25.1	29.1	22.2	24.7
153	14690	2.0	30.4	40.0	44.9	38.8	41.1	22.2	36.2

REGION -MOUNT. ATTACK 430 INTEGRATED DOSE INTERVAL=0-999

POPULATION ITEM	TOTALS	PROMPT	15 DEC 51	25 DEC 51	15 MAY 51	15 JUN 51	5 JUL 52	25 NOV 50	SIX WIND AVERAGE
1	856956	2.1	68.2	54.9	69.4	70.0	65.3	60.7	64.7
3	68547	12.8	57.4	38.3	52.9	51.4	43.2	51.6	49.1
6	46012	17.2	53.7	31.9	48.3	47.2	37.3	47.2	44.3
7	57070	3.1	62.6	53.7	65.7	59.2	57.8	63.0	60.3
10	87708	11.9	58.6	38.8	53.8	53.5	44.3	52.2	50.2
12	52764	14.9	56.2	38.3	53.4	48.6	43.4	50.6	48.4
24	23418	16.8	54.2	35.1	47.1	46.4	36.7	47.7	44.6
25	12139	15.4	54.9	35.9	49.9	48.1	39.8	48.8	46.2
74	35254	20.1	54.2	34.0	50.1	46.4	39.1	45.2	44.8
94	20764	25.2	43.7	26.5	45.7	43.2	35.3	37.1	38.6
135	413186	3.6	66.9	55.1	64.1	64.4	60.5	58.6	61.6
148	235616	3.8	61.2	43.4	60.0	54.1	48.3	61.0	54.7
149	98267	4.3	60.2	38.2	58.3	53.6	42.2	58.1	51.8
150	15279	2.2	63.4	53.1	66.5	57.7	52.3	72.4	60.9
151	4870	3.6	62.3	43.3	69.4	59.2	53.3	56.1	57.3
152	117207	3.7	61.8	46.5	60.2	53.7	52.8	62.1	56.2
159	50553	3.0	59.3	43.6	59.0	54.8	47.9	63.6	54.7
37	23309	14.0	56.2	37.4	52.3	49.8	42.4	50.4	48.1
38	22353	4.1	62.5	47.5	63.3	56.9	51.7	62.8	57.5
39	18373	12.1	57.2	39.5	52.0	51.1	40.4	53.3	48.9
40	16743	16.0	50.5	23.2	49.8	45.7	32.5	44.2	41.0
41	12762	22.0	48.9	33.0	49.2	46.0	42.0	48.0	44.5
42	18568	14.7	56.8	40.9	52.7	48.9	46.4	49.0	49.1
43	46771	14.7	55.5	36.0	52.2	49.3	42.3	49.8	47.5
44	9534	19.9	52.4	28.5	47.6	44.4	34.6	46.7	42.4
45	15536	12.2	57.6	37.8	52.5	53.0	42.6	53.0	49.4
46	16077	15.5	58.3	37.4	51.6	50.3	43.6	45.0	47.7
153	10596	3.8	61.8	52.7	63.8	56.3	59.4	60.3	59.1

REGION -N.WEST ATTACK 430 INTEGRATED DOSE INTERVAL=0-999

POPULATION ITEM	TOTALS	PROMPT	15 DEC 51	25 DEC 51	15 MAY 51	15 JUN 51	5 JUL 52	25 NOV 50	SIX WIND AVERAGE
1	162957	1.3	59.6	71.3	48.1	50.4	61.0	75.7	61.0
3	46222	29.8	41.7	44.0	23.6	31.4	30.9	50.8	37.1
6	30440	40.8	33.1	34.8	15.5	22.3	21.8	40.1	27.9
7	30091	3.7	60.7	63.7	37.8	47.1	48.2	64.8	53.7
10	50068	27.7	41.3	43.8	23.5	30.9	30.4	50.4	36.7
12	46262	33.6	42.1	43.0	23.5	31.5	30.9	50.5	36.9
24	18408	37.9	34.1	35.5	17.7	24.0	23.6	41.0	29.3
25	9248	34.3	38.4	40.3	21.2	28.2	27.7	46.6	33.8
74	24168	46.2	32.7	32.6	18.2	23.4	23.5	38.4	28.1
94	32311	40.4	42.2	42.3	26.8	34.4	33.1	47.9	37.8
135	62429	1.2	43.5	55.4	38.0	31.7	41.6	61.7	45.3
148	98111	2.5	43.2	53.3	30.7	31.8	36.8	55.1	41.8
149	57546	2.1	35.3	43.3	26.6	23.8	26.8	47.8	33.9
150	11300	5.2	72.5	71.7	46.9	59.6	58.1	69.1	63.0
151	5946	6.1	68.6	74.2	33.6	51.3	48.9	74.4	58.5
152	23327	1.4	42.0	63.7	32.3	33.3	48.2	61.2	46.8
159	36570	2.2	48.1	59.7	33.2	37.1	44.7	58.0	46.8
37	16370	32.6	40.2	41.8	22.7	30.2	29.8	48.5	35.5
38	10772	3.8	51.7	56.9	31.9	38.2	40.5	58.5	46.3
39	10784	27.6	39.6	42.9	21.2	29.3	29.2	50.7	35.5
40	27160	31.6	46.4	47.8	30.8	37.6	36.8	53.4	42.1
41	12484	32.3	38.3	41.1	20.1	29.5	26.7	48.7	34.1
42	12767	38.7	34.9	35.4	18.3	24.1	23.4	41.7	29.6
43	32594	35.4	38.0	38.9	20.4	27.2	27.2	45.7	32.9
44	6669	46.2	31.2	31.7	14.1	21.0	20.7	36.6	25.9
45	10321	28.6	43.2	45.4	25.7	33.7	33.3	51.8	38.9
46	8344	32.7	40.2	45.4	18.1	30.3	29.8	50.8	35.8
153	2504	2.1	53.4	66.6	41.1	42.9	55.6	69.3	55.2

U. S. TOTALS   ATTACK 430   INTEGRATED DOSE INTERVAL=0-2999

POPULATION ITEM	TOTALS	PROMPT	15 DEC 51	25 DEC 51	15 MAY 51	15 JUN 51	5 JUL 52	25 NOV 50	SIX WIND AVERAGE
1	2971499	2.5	67.9	69.0	69.2	69.4	67.1	66.2	68.2
3	1784656	26.8	34.4	39.5	39.2	40.1	39.9	40.4	38.9
6	1246526	36.5	28.0	32.4	32.3	31.9	32.1	33.9	31.8
7	1343059	2.0	51.1	59.2	57.7	63.3	63.5	57.7	58.8
10	2019672	25.8	35.4	40.6	39.9	40.8	40.7	40.6	39.7
12	1653024	26.6	33.9	38.3	39.2	40.9	40.0	40.7	38.8
24	675084	34.5	25.4	31.1	30.8	30.0	30.8	34.2	30.4
25	329959	31.5	29.5	34.7	34.7	34.8	34.9	37.1	34.3
74	**1103668**	**48.1**	**24.1**	**28.3**	**28.6**	**27.4**	**28.0**	**28.4**	**27.5**
94	1387922	35.9	23.7	29.9	31.5	32.2	34.1	31.9	30.5
135	1750307	3.0	63.0	66.0	65.8	65.8	63.7	62.2	64.4
148	3039695	2.7	53.9	56.8	57.9	62.8	61.7	57.3	58.4
149	1331375	3.0	59.1	58.1	61.4	62.5	64.2	57.8	60.5
150	401179	2.5	39.1	50.2	52.3	59.9	55.7	55.3	52.1
151	225141	2.5	46.8	58.4	56.0	61.1	55.4	57.7	55.9
152	1076563	2.4	54.8	57.1	55.9	64.5	61.9	57.1	58.5
159	1961169	1.9	57.0	58.0	57.8	66.1	65.1	57.4	60.2
37	642352	28.9	32.6	37.7	37.7	38.7	38.6	39.1	37.4
38	424202	3.0	52.2	57.9	57.3	61.7	60.7	56.4	57.7
39	379219	24.5	36.8	42.4	41.0	41.8	40.6	42.7	40.9
40	982094	30.6	26.0	30.7	32.9	34.3	35.4	34.4	32.3
41	765932	29.1	28.8	36.9	36.5	39.1	39.4	39.2	36.7
42	443688	32.4	30.8	35.6	35.3	35.1	35.4	37.2	34.9
43	1174589	30.0	33.1	37.9	37.3	38.2	37.9	38.9	37.2
44	266623	38.3	27.0	31.1	30.4	30.8	30.6	34.5	30.8
45	337926	24.5	36.3	41.1	41.1	42.2	42.2	41.4	40.7
46	317218	35.3	32.3	34.7	34.7	35.6	34.2	35.9	34.6
153	92303	2.4	53.9	60.2	60.1	62.8	60.7	57.0	59.1

REGION -N.EAST   ATTACK 430   INTEGRATED DOSE INTERVAL=0-2999

POPULATION ITEM	TOTALS	PROMPT	15 DEC 51	25 DEC 51	15 MAY 51	15 JUN 51	5 JUL 52	25 NOV 50	SIX WIND AVERAGE
1	163593	2.6	40.3	41.1	67.7	69.1	68.2	40.2	54.4
3	446779	34.4	8.5	6.8	28.4	24.7	25.9	29.7	20.7
6	357939	41.3	5.7	4.2	23.0	18.5	20.1	28.3	16.6
7	91118	2.6	28.3	28.2	55.8	64.4	62.2	26.9	44.3
10	465707	32.1	9.0	7.2	29.7	25.5	26.7	30.8	21.5
12	449988	35.5	9.4	7.2	29.1	26.4	27.0	27.8	21.2
24	204904	33.9	5.3	3.7	24.8	18.3	20.4	33.1	17.6
25	93456	35.5	6.9	5.3	26.7	21.5	23.1	30.6	19.0
74	**384765**	**67.2**	**3.6**	**2.6**	**14.3**	**10.9**	**12.8**	**15.6**	**10.0**
94	452781	38.8	7.6	5.2	26.8	23.8	25.1	24.7	18.9
135	56329	2.0	35.1	33.9	60.2	68.2	63.6	29.7	48.4
148	229209	3.5	25.8	28.2	56.9	59.9	59.0	29.9	43.3
149	66431	5.4	22.4	23.2	52.4	50.1	54.7	35.3	39.7
150	96556	2.1	30.7	29.3	61.1	67.9	64.5	25.1	46.4
151	40137	4.2	21.9	31.0	55.1	55.2	50.4	37.8	41.9
152	26105	2.7	21.8	32.3	55.5	62.9	62.6	21.7	42.8
159	164942	3.2	26.7	25.0	54.2	57.4	58.2	32.0	42.2
37	170972	36.0	7.9	6.3	27.6	23.7	25.0	28.7	19.9
38	34351	5.3	23.3	24.4	54.6	56.2	55.1	30.3	40.7
39	87191	30.1	8.1	7.2	31.6	25.9	26.7	33.1	22.1
40	305811	29.4	9.0	5.6	30.7	26.7	27.7	30.6	21.7
41	265616	37.4	7.2	7.0	27.1	24.0	25.5	24.4	19.2
42	118945	39.3	7.0	5.1	23.5	20.8	22.2	30.0	18.1
43	297900	38.1	7.6	6.1	26.0	22.3	23.7	28.8	19.1
44	86053	44.9	4.9	3.6	20.6	15.6	18.1	29.2	15.3
45	82973	30.8	9.7	7.7	31.5	27.0	28.3	30.2	22.4
46	77800	38.9	7.5	5.9	26.8	23.6	25.0	28.0	19.5
153	5010	1.9	31.2	31.0	59.1	67.6	64.3	25.8	46.5

REGION -S.EAST ATTACK 430 INTEGRATED DOSE INTERVAL=0-2999

POPULATION ITEM	TOTALS	PROMPT	15 DEC 51	25 DEC 51	15 MAY 51	15 JUN 51	5 JUL 52	25 NOV 50	SIX WIND AVERAGE
1	447603	1.1	64.2	77.2	67.4	72.8	72.7	63.6	69.6
3	380213	15.6	50.5	65.2	55.2	59.8	54.3	55.3	56.7
6	206811	25.9	45.5	57.4	49.3	52.2	43.7	47.5	49.3
7	440215	0.9	56.2	73.4	63.7	69.8	73.7	62.3	66.5
10	439169	15.6	51.7	65.6	55.2	59.3	54.2	54.0	56.7
12	315169	14.2	50.5	65.3	55.9	60.9	53.4	57.3	57.2
24	93789	29.3	38.8	51.1	43.4	46.2	38.8	44.6	43.8
25	55109	22.0	44.8	58.9	49.8	54.0	46.7	51.4	50.9
74	152237	24.7	41.8	56.8	50.0	51.5	44.3	46.9	48.5
94	195435	16.2	40.2	67.8	53.8	58.2	55.2	55.9	55.2
135	236925	0.8	61.5	74.7	67.1	70.1	73.0	61.5	68.0
148	528412	1.1	62.4	69.8	64.2	69.1	69.1	61.3	66.0
149	293619	1.1	69.4	67.7	64.6	71.9	72.4	59.4	67.5
150	53651	1.9	47.4	67.7	57.5	60.1	55.0	60.2	58.0
151	71310	0.8	62.3	78.9	61.2	67.6	65.8	69.2	67.5
152	103448	1.0	53.9	68.6	66.7	65.2	67.3	59.5	63.5
159	776310	1.0	70.5	74.9	62.4	75.1	72.2	61.2	69.4
37	128971	17.2	49.2	64.4	53.9	59.2	53.7	54.9	55.9
38	120665	1.3	61.4	71.7	63.1	70.0	70.6	60.4	66.2
39	87450	15.7	51.9	65.1	55.1	61.5	53.1	57.3	57.3
40	122760	17.0	43.2	65.2	53.9	57.8	54.2	55.3	54.9
41	183746	9.9	50.9	73.9	58.2	69.0	65.6	67.0	64.1
42	81201	21.7	44.3	59.0	52.0	53.0	45.7	50.2	50.7
43	227604	18.2	49.5	63.4	53.6	58.4	51.1	53.8	55.0
44	45079	24.9	46.5	58.7	47.9	54.3	44.1	49.2	50.1
45	66265	16.2	50.3	65.2	54.0	59.3	55.5	54.2	56.4
46	77608	38.3	38.3	45.9	38.1	39.4	35.0	37.6	39.1
153	13755	0.9	56.0	72.6	69.2	66.8	69.6	60.2	65.7

REGION -E.N.C. ATTACK 430 INTEGRATED DOSE INTERVAL=0-2999

POPULATION ITEM	TOTALS	PROMPT	15 DEC 51	25 DEC 51	15 MAY 51	15 JUN 51	5 JUL 52	25 NOV 50	SIX WIND AVERAGE
1	244611	1.2	50.9	53.4	48.9	57.9	61.9	69.8	57.1
3	362252	31.1	29.1	34.3	27.7	36.5	41.1	34.3	33.8
6	264366	41.6	23.7	29.7	22.5	30.5	36.1	25.9	28.1
7	256227	0.7	44.2	47.2	44.0	58.6	58.7	66.6	53.2
10	424715	30.3	28.9	34.9	27.9	37.4	42.1	33.7	34.1
12	336007	30.0	30.9	33.9	28.8	37.5	41.4	38.6	35.2
24	157631	39.0	23.1	33.1	22.4	30.7	37.2	24.7	28.6
25	71985	35.2	26.5	33.1	25.1	33.7	38.9	30.0	31.2
74	215192	51.2	20.2	24.2	18.4	24.9	29.9	24.6	23.7
94	407362	38.7	25.0	30.2	22.9	31.2	37.1	28.7	29.2
135	161541	0.6	46.5	47.5	46.2	58.5	61.3	67.6	54.6
148	520343	1.0	48.5	45.9	44.8	60.0	64.6	67.9	55.3
149	191030	1.7	55.0	42.3	48.2	63.1	68.3	63.2	56.7
150	106538	0.6	32.2	45.8	38.0	58.0	57.2	75.9	51.2
151	26556	0.6	42.1	43.0	46.6	58.1	49.5	68.5	51.3
152	196279	0.6	52.0	49.9	45.0	58.4	67.1	68.2	56.8
159	423744	0.8	51.9	42.5	47.8	59.2	61.0	61.9	54.1
37	132985	33.2	28.3	33.2	26.4	35.4	39.9	33.3	32.7
38	67174	1.8	43.5	46.5	42.3	56.9	58.6	66.9	52.4
39	65183	29.0	29.6	36.6	27.9	37.3	42.3	34.6	34.7
40	325222	33.3	27.8	31.5	26.1	34.5	39.6	30.1	31.6
41	141252	34.9	27.7	33.6	23.4	33.1	35.8	33.1	31.1
42	88648	37.2	26.5	31.8	25.1	31.2	38.0	29.5	30.4
43	235700	34.0	27.9	32.8	26.4	35.3	39.9	33.1	32.6
44	46377	43.1	23.1	29.3	20.7	29.5	34.5	26.0	27.2
45	66371	27.0	31.0	37.5	32.3	40.8	45.2	34.0	36.8
46	50521	38.5	28.4	30.3	23.0	34.9	38.5	31.8	31.2
153	13672	0.6	41.1	46.6	42.7	57.9	61.9	71.5	53.9

REGION -W.N.C. ATTACK 430 INTEGRATED DOSE INTERVAL=0-2999

POPULATION ITEM	TOTALS	PROMPT	15 DEC 51	25 DEC 51	15 MAY 51	15 JUN 51	5 JUL 52	25 NOV 50	SIX WIND AVERAGE
1	509674	5.6	38.6	42.9	52.3	52.8	45.0	48.1	46.6
3	153950	23.7	26.5	31.5	32.0	46.1	40.2	42.7	36.5
6	90463	36.3	22.0	22.9	22.6	38.2	34.7	36.6	29.5
7	282916	3.8	34.2	43.9	48.4	61.6	51.1	50.3	48.2
10	175861	24.0	26.1	30.2	31.1	45.9	39.3	43.1	36.0
12	172061	22.1	27.4	34.0	34.3	47.8	42.7	43.1	38.2
24	44979	33.6	23.5	24.3	22.2	40.5	36.4	38.5	30.9
25	25952	28.9	25.0	28.0	27.1	43.0	38.3	40.4	33.6
74	92623	35.8	23.5	25.9	26.7	38.4	36.6	33.3	30.7
94	86723	44.3	19.1	18.5	17.7	33.6	32.6	35.1	26.1
135	440663	5.9	36.5	44.0	51.1	55.2	47.1	45.0	46.5
148	779900	3.7	38.4	42.9	47.7	65.2	56.9	47.0	49.7
149	247491	5.7	33.8	39.5	45.8	64.2	57.4	44.6	47.5
150	64587	2.8	24.8	44.9	53.5	59.0	45.2	59.0	47.7
151	32569	2.0	32.8	46.5	54.6	69.9	53.5	52.4	51.6
152	435310	2.9	43.5	44.3	47.4	66.4	58.5	46.3	51.1
159	263030	4.6	28.4	40.4	43.3	66.3	57.5	52.1	48.0
37	55582	25.4	26.0	30.4	31.1	45.6	40.2	41.8	35.8
38	89565	3.9	34.6	43.2	48.7	62.7	52.1	49.5	48.4
39	31439	22.5	25.8	31.8	31.5	46.3	41.2	43.2	36.6
40	51123	38.0	20.4	20.0	17.6	38.0	34.7	41.4	28.7
41	52455	32.8	21.8	28.0	25.1	40.5	37.6	40.2	32.2
42	41699	31.0	23.3	26.8	26.8	39.9	36.5	37.4	31.8
43	108469	25.9	26.3	30.5	30.8	45.1	39.7	40.3	35.5
44	21644	35.0	23.3	22.7	21.2	39.6	36.5	36.2	29.9
45	32497	20.5	29.3	31.5	33.7	51.1	41.8	45.9	38.9
46	23281	30.0	24.2	28.1	27.3	40.9	36.2	39.2	32.6
153	28376	3.6	37.2	45.2	51.4	60.9	51.7	47.5	49.0

REGION -S.CEN. ATTACK 430 INTEGRATED DOSE INTERVAL=0-2999

POPULATION ITEM	TOTALS	PROMPT	15 DEC 51	25 DEC 51	15 MAY 51	15 JUN 51	5 JUL 52	25 NOV 50	SIX WIND AVERAGE
1	429332	1.8	82.3	79.0	74.4	63.1	62.0	55.8	69.4
3	169520	23.0	61.7	58.1	51.7	37.6	44.3	34.1	47.9
6	114777	32.3	55.9	53.2	45.9	33.3	39.2	30.8	43.0
7	151632	2.2	70.6	68.2	70.2	48.2	59.7	44.2	60.2
10	202207	24.5	60.7	56.7	51.9	37.7	44.7	34.1	47.6
12	142979	18.2	65.1	62.1	52.3	39.7	44.5	35.7	49.9
24	44549	32.2	55.4	53.8	46.0	32.2	37.1	28.9	42.2
25	25801	27.9	58.4	56.3	48.2	34.7	39.9	31.5	44.8
74	98472	34.5	51.5	52.2	44.9	30.8	35.0	28.7	40.5
94	71366	33.0	50.9	47.4	43.2	26.2	35.5	17.5	36.8
135	321592	1.4	83.6	83.2	80.6	67.5	64.2	61.4	73.4
148	365893	2.0	74.9	73.0	77.7	56.1	63.3	53.6	66.4
149	205064	1.5	72.8	68.3	82.3	54.0	70.3	53.9	66.9
150	20712	4.8	74.1	75.4	58.2	49.0	45.2	43.8	57.6
151	22774	3.2	59.7	71.6	64.6	57.0	46.4	52.3	58.6
152	117907	2.1	81.3	81.3	75.7	61.0	57.8	55.1	68.7
159	133425	1.9	69.3	59.7	76.0	47.0	61.8	43.2	59.5
37	56573	24.7	60.5	57.7	50.3	36.5	42.5	33.3	46.8
38	53441	2.8	73.2	69.4	72.5	51.8	60.7	48.6	62.7
39	42628	23.3	62.2	59.3	50.8	37.7	44.1	34.0	48.0
40	41752	29.2	56.7	52.2	36.3	26.3	29.7	21.8	37.2
41	49790	26.4	56.2	52.6	48.0	34.1	41.0	25.8	43.0
42	42478	30.0	55.9	54.5	46.3	32.9	37.8	29.2	42.8
43	117375	26.7	59.6	57.2	49.6	36.4	42.1	33.6	46.4
44	21910	35.9	52.5	51.4	41.5	29.0	33.7	27.4	39.2
45	32287	20.1	66.0	61.5	53.3	38.9	48.1	37.2	50.8
46	28182	29.9	60.5	57.7	48.4	37.9	39.7	36.3	46.8
153	14690	2.0	77.9	76.8	72.1	55.9	56.7	47.3	64.5

REGION -MOUNT. ATTACK 430 INTEGRATED DOSE INTERVAL=0-2999

POPULATION ITEM	TOTALS	PROMPT	15 DEC 51	25 DEC 51	15 MAY 51	15 JUN 51	5 JUL 52	25 NOV 50	SIX WIND AVERAGE
1	656556	2.1	88.1	81.7	83.9	83.0	80.1	82.5	83.2
3	68547	12.6	77.6	74.6	67.0	61.7	60.4	66.7	68.0
6	46012	17.2	72.8	70.5	61.1	54.6	54.3	59.4	62.1
7	57070	3.1	86.7	84.1	81.3	78.9	73.5	82.8	81.2
10	67708	11.9	78.9	75.4	67.8	62.6	61.7	67.5	69.0
12	52764	14.9	74.8	73.7	66.9	62.3	60.3	65.3	67.2
24	23418	16.8	74.0	71.7	60.5	54.0	55.1	60.4	62.6
25	12139	15.4	75.0	72.5	63.5	57.5	57.3	62.8	64.8
74	35254	20.1	69.4	68.7	61.7	56.2	53.6	57.2	61.1
94	20764	25.2	67.9	68.5	58.2	51.3	53.4	51.7	58.5
135	413186	3.6	81.5	77.7	77.5	75.7	75.7	77.7	77.7
148	235616	3.8	83.3	78.9	76.6	73.0	61.4	78.7	75.3
149	98287	4.3	82.2	71.7	79.6	70.0	54.3	78.8	72.8
150	15279	2.2	94.5	93.3	80.8	82.9	71.1	87.5	85.0
151	4870	3.6	85.1	84.5	82.3	75.3	73.6	76.7	79.6
152	117207	3.7	82.8	82.9	73.3	74.0	65.6	77.6	76.0
159	50553	3.0	82.8	73.9	85.4	73.4	58.5	80.5	75.8
37	23309	14.0	76.5	73.9	66.1	60.4	59.6	65.0	66.9
38	22353	4.1	84.5	80.8	79.9	75.3	65.2	80.6	77.7
39	18373	12.1	78.3	76.2	64.5	60.3	57.9	67.7	67.5
40	16743	16.0	77.2	76.0	65.9	57.6	58.4	60.4	65.9
41	12782	22.0	70.4	70.2	60.6	55.9	57.4	59.4	62.3
42	16568	14.7	75.4	74.7	65.7	58.6	62.9	63.9	66.9
43	46771	14.7	75.1	73.3	65.3	59.5	59.3	63.8	66.0
44	9534	19.9	70.2	69.6	58.5	53.2	50.7	57.7	60.0
45	15536	12.2	78.3	75.1	66.7	63.3	62.5	68.6	69.1
46	16077	15.5	75.8	71.4	63.1	58.4	59.8	62.5	65.2
153	10596	3.8	82.2	81.1	76.5	75.6	72.6	77.4	77.6

REGION -N.WEST ATTACK 430 INTEGRATED DOSE INTERVAL=0-2999

POPULATION ITEM	TOTALS	PROMPT	15 DEC 51	25 DEC 51	15 MAY 51	15 JUN 51	5 JUL 52	25 NOV 50	SIX WIND AVERAGE
1	162957	1.3	94.4	91.7	76.9	81.3	82.9	98.7	87.6
3	46222	29.8	66.3	69.1	49.1	60.1	63.3	70.2	63.0
6	30440	40.8	55.6	58.9	38.4	51.3	54.1	59.2	52.9
7	30091	3.7	90.8	92.0	72.9	73.2	82.9	96.3	84.7
10	50088	27.7	67.8	71.2	49.4	61.7	65.4	72.3	64.6
12	46262	33.6	63.9	65.2	48.8	57.8	60.0	66.4	60.3
24	18408	37.9	57.9	61.6	40.3	53.1	56.0	62.1	55.2
25	9248	34.3	61.8	64.8	45.1	56.4	59.3	65.7	58.9
74	24168	46.2	50.7	53.0	38.2	44.7	47.8	53.8	48.0
94	32311	40.4	58.8	58.9	46.0	55.9	56.5	59.6	55.9
135	62429	1.2	91.2	90.6	69.2	67.7	76.3	98.9	82.3
148	98111	2.5	87.9	94.5	66.5	59.8	79.6	97.5	81.0
149	57546	2.1	85.9	95.2	65.2	49.0	74.8	97.9	78.0
150	11300	5.2	91.0	91.9	77.3	86.6	87.9	94.8	88.3
151	5946	6.1	91.7	93.4	70.9	86.0	89.2	93.9	87.5
152	23327	1.4	90.6	94.4	63.5	66.7	85.1	98.6	83.1
159	36570	2.2	84.8	96.6	72.1	61.9	82.8	97.8	82.7
37	16370	32.6	63.5	66.3	47.4	57.3	60.4	67.4	60.4
38	10772	3.8	89.8	92.2	65.9	67.4	81.1	96.2	82.1
39	10784	27.6	65.6	71.5	48.8	58.9	62.8	72.4	63.3
40	27160	31.6	67.7	67.2	50.7	65.8	65.5	68.4	64.2
41	12464	32.3	59.5	67.4	45.4	54.2	57.1	67.7	58.6
42	12767	38.7	57.5	60.5	41.6	52.0	54.9	61.3	54.6
43	32594	35.4	61.2	63.7	44.8	55.0	58.1	64.6	57.9
44	6889	46.2	51.4	53.4	36.2	47.4	49.7	53.8	48.7
45	10321	28.6	67.1	70.3	52.8	58.9	63.9	71.4	64.1
46	8344	32.7	63.1	66.3	46.5	58.7	60.7	67.3	60.4
153	2504	2.1	93.1	92.3	71.9	77.5	84.2	97.9	86.2

POPULATION ITEM	U. S. TOTALS TOTALS	PROMPT	ATTACK 5100 15 DEC 51	25 DEC 51	15 MAY 51	INTEGRATED DOSE INTERVAL=0-999 15 JUN 51	5 JUL 52	25 NOV 50	SIX WIND AVERAGE
1	2971499	0.4	78.8	75.6	78.6	80.1	77.9	78.1	78.2
3	1784656	24.0	41.1	38.7	37.9	41.0	38.6	42.5	40.0
6	1246526	33.2	32.8	31.2	29.5	33.1	30.7	35.5	32.1
7	1343059	0.4	72.9	66.6	67.3	68.5	66.4	67.1	68.1
10	2019872	22.7	42.1	39.7	38.8	41.9	39.6	43.1	40.9
12	1653024	24.3	41.3	38.7	38.6	42.0	39.5	42.9	40.5
24	675084	31.5	30.5	29.9	26.1	29.0	26.3	33.3	29.2
25	329959	28.6	35.2	33.7	31.6	34.8	32.3	37.5	34.2
74	1103668	46.1	30.1	28.6	27.3	29.6	28.3	31.4	29.2
94	1387922	34.0	27.4	25.8	24.7	29.0	26.2	29.4	27.1
135	1750307	0.2	82.7	78.8	79.0	80.4	78.1	79.6	79.8
148	3039695	0.6	72.[illegible]	66.6	68.1	71.2	68.8	69.2	69.4
149	1331375	0.7	72.5	65.6	71.5	73.9	69.8	70.9	70.7
150	401179	1.0	54.3	53.8	58.7	59.6	53.5	55.4	55.9
151	225141	0.8	61.1	55.7	56.9	59.7	56.8	64.2	59.1
152	1076563	0.4	82.3	74.9	69.5	74.3	75.7	73.1	75.0
159	1961169	0.4	69.0	58.1	64.1	67.0	65.7	65.2	64.8
37	642352	26.2	39.2	36.6	35.9	39.1	36.7	40.8	38.1
38	424202	1.2	71.0	65.6	67.2	68.2	65.6	67.5	67.5
39	379219	21.4	43.9	41.4	39.9	42.7	40.3	45.3	42.3
40	982094	28.5	29.0	26.2	25.0	30.3	27.5	30.7	28.1
41	765932	27.0	34.4	31.7	33.4	35.8	33.2	38.5	34.5
42	443688	29.7	37.6	36.2	33.5	36.2	34.7	39.3	36.3
43	1174589	27.1	39.8	37.4	36.2	39.6	37.4	41.6	38.7
44	268623	35.6	32.5	30.5	29.1	32.0	29.7	36.4	31.7
45	337926	21.7	42.9	39.8	39.6	42.9	40.8	44.1	41.7
46	317218	30.8	38.7	36.7	34.8	38.7	35.8	38.9	37.3
153	92303	0.4	77.6	73.1	71.2	73.4	72.5	73.5	73.6

POPULATION ITEM	REGION -N.EAST TOTALS	PROMPT	ATTACK 5100 15 DEC 51	25 DEC 51	15 MAY 51	INTEGRATED DOSE INTERVAL=0-999 15 JUN 51	5 JUL 52	25 NOV 50	SIX WIND AVERAGE
1	163593	1.4	0.7	25.4	56.8	62.7	58.2	32.1	39.3
3	446779	32.5	0.4	2.7	18.3	20.8	17.3	22.5	13.7
6	357939	39.5	0.2	1.5	14.5	16.2	12.4	21.9	11.1
7	91118	1.1	1.3	11.0	39.0	50.2	50.3	19.5	28.6
10	465707	30.1	0.5	3.0	19.3	21.6	18.0	23.0	14.2
12	449988	33.7	0.5	2.7	19.5	22.5	18.5	21.4	14.2
24	204904	32.3	0.3	1.1	15.3	15.5	11.3	25.3	11.5
25	93456	33.7	0.4	1.9	16.9	18.1	14.5	23.3	12.5
74	384765	66.2	0.4	0.9	8.8	10.0	9.3	12.7	7.0
94	452781	37.3	0.2	1.6	17.3	19.8	15.5	17.6	12.0
135	56329	0.8	1.1	15.8	48.3	59.6	53.9	22.3	33.5
148	229209	1.5	1.5	11.6	42.1	47.8	46.9	25.6	29.2
149	66431	2.2	2.6	12.6	33.4	38.8	38.6	34.9	26.8
150	96556	1.0	0.5	11.4	51.5	60.0	52.6	17.1	32.2
151	40137	1.5	1.6	12.3	40.9	38.7	42.2	37.1	28.8
152	26105	1.4	2.7	8.5	30.9	39.3	54.3	15.7	25.2
159	164942	0.9	2.4	13.0	32.6	42.3	46.4	31.3	28.0
37	170972	34.3	0.4	2.3	17.8	20.0	16.6	21.9	13.2
38	34351	3.4	1.2	9.5	39.8	45.2	42.5	23.7	27.0
39	87191	28.3	0.6	2.7	19.9	20.9	17.7	24.8	14.4
40	305811	27.7	0.5	1.3	20.5	23.0	16.8	21.3	13.9
41	265616	35.6	0.5	3.0	16.5	18.8	17.2	19.6	12.6
42	118945	37.9	0.4	1.9	14.1	16.8	14.9	22.6	11.8
43	297900	36.3	0.4	2.2	16.8	19.0	15.8	22.5	12.8
44	86053	43.3	0.3	1.0	14.2	14.7	11.0	23.7	10.8
45	82973	28.8	0.4	3.0	21.5	24.0	19.5	22.9	15.2
46	77800	36.7	0.3	2.8	18.1	19.7	19.3	21.4	13.6
153	5010	0.9	1.0	12.1	45.8	57.2	54.2	17.0	31.2

REGION -S.EAST ATTACK 5100 INTEGRATED DOSE INTERVAL=0-999

POPULATION ITEM	TOTALS	PROMPT	15 DEC 51	25 DEC 51	15 MAY 51	15 JUN 51	5 JUL 52	25 NOV 50	SIX WIND AVERAGE
1	447603	0.3	77.8	73.6	74.7	65.9	66.6	72.3	71.8
3	380213	11.6	68.3	62.1	62.5	55.4	54.3	60.4	60.5
6	206811	19.9	61.6	54.5	54.9	51.8	50.7	54.8	54.7
7	440215	0.2	78.4	74.4	77.5	66.8	64.7	70.2	72.0
10	439169	11.2	68.3	61.4	62.8	56.7	55.6	60.5	60.9
12	315169	11.3	69.4	65.2	64.2	55.2	54.3	61.7	61.7
24	93789	23.3	58.1	52.8	47.1	42.4	41.3	47.3	48.2
25	55109	17.1	63.3	57.7	55.2	49.6	48.3	55.0	54.8
74	152237	21.2	58.6	55.6	55.3	47.8	45.4	52.6	52.5
94	195435	13.7	62.3	60.9	58.2	51.9	49.7	59.4	57.1
135	236925	0.2	78.9	74.7	76.0	66.7	66.4	71.9	72.4
148	528412	0.3	79.2	73.9	76.2	68.6	65.2	73.0	72.7
149	293619	0.2	79.5	74.9	82.0	76.6	71.4	75.6	76.7
150	53851	0.6	77.0	73.1	62.0	51.4	48.5	62.8	62.5
151	71310	0.5	82.1	61.9	62.5	58.1	58.3	76.6	66.6
152	103448	0.3	76.4	78.1	75.3	60.3	58.9	66.8	69.3
159	778310	0.2	78.8	70.1	77.6	73.3	70.4	76.1	74.4
37	128971	13.5	66.9	60.0	60.6	54.6	53.2	59.9	59.2
38	120665	0.5	77.9	73.9	77.2	68.8	65.8	71.4	72.5
39	87450	11.6	69.2	61.4	61.7	56.0	54.8	61.3	60.8
40	122760	13.2	65.9	62.1	58.3	53.0	51.8	58.4	58.2
41	183746	7.9	70.1	58.4	63.4	59.8	56.2	67.9	62.6
42	81201	17.4	63.1	57.8	56.7	47.9	48.2	54.5	54.7
43	227604	14.0	66.6	59.8	60.9	54.7	53.5	59.7	59.2
44	45079	20.4	62.3	54.2	54.2	50.4	49.3	54.1	54.1
45	66285	12.4	67.1	61.2	60.6	54.2	53.1	60.4	59.4
46	77608	30.3	55.0	48.1	42.7	40.8	41.1	45.6	45.5
153	13755	0.2	78.7	75.6	74.6	63.2	61.5	70.7	70.7

REGION -E.N.C. ATTACK 5100 INTEGRATED DOSE INTERVAL=0-999

POPULATION ITEM	TOTALS	PROMPT	15 DEC 51	25 DEC 51	15 MAY 51	15 JUN 51	5 JUL 52	25 NOV 50	SIX WIND AVERAGE
1	244811	1.1	63.8	41.2	41.2	57.4	54.2	57.2	52.5
3	362252	31.1	35.2	25.1	16.4	26.7	23.6	25.0	25.3
6	264368	41.6	29.5	22.0	11.5	20.6	18.2	18.5	20.1
7	256227	0.6	58.4	37.8	37.9	51.1	44.5	52.6	47.1
10	424715	30.3	35.1	25.2	15.8	26.8	23.4	24.6	25.2
12	336007	30.0	37.1	26.2	19.3	29.4	26.3	28.9	27.9
24	157831	39.0	31.9	24.0	10.5	19.1	16.8	17.1	19.9
25	71985	35.2	33.5	24.3	13.5	23.3	20.5	21.5	22.8
74	215192	51.2	27.7	20.8	11.4	18.8	16.9	18.6	19.0
94	407382	38.7	30.6	20.6	10.9	22.0	18.5	20.1	20.5
135	161541	0.5	62.5	37.8	40.2	51.8	49.2	53.2	49.1
148	520343	1.0	66.8	38.8	38.0	50.3	51.3	53.7	49.8
149	191030	1.7	66.8	28.2	29.1	53.5	55.6	46.9	46.7
150	106538	0.5	59.9	51.5	48.6	51.0	38.2	64.9	52.4
151	26556	0.6	54.5	40.8	38.6	48.6	35.3	54.2	45.3
152	196279	0.5	72.2	41.9	40.9	47.1	56.5	54.1	52.1
159	423744	0.7	61.7	29.5	32.5	48.7	47.4	46.5	44.4
37	132985	33.2	34.8	24.7	15.7	25.7	22.7	24.4	24.7
38	67174	1.7	60.8	39.9	39.3	48.4	44.2	53.7	47.7
39	65183	29.0	37.4	27.6	17.2	26.8	23.7	25.4	26.3
40	325222	33.3	32.1	21.7	11.4	23.1	21.1	21.2	21.8
41	141252	34.9	33.2	25.5	16.4	25.1	18.3	24.1	23.8
42	88648	37.2	34.0	25.2	14.4	22.8	20.8	21.9	23.2
43	235700	34.0	34.7	24.8	15.7	26.0	22.9	24.5	24.8
44	48377	43.1	31.5	22.7	11.5	20.8	18.1	19.5	20.7
45	66371	27.0	38.2	24.8	19.4	27.7	27.4	25.7	27.2
46	50521	38.5	31.1	22.8	14.0	25.2	21.0	20.5	22.4
153	13672	0.4	64.7	46.2	45.3	49.4	48.2	58.6	52.1

REGION -W.N.C. ATTACK 5100 INTEGRATED DOSE INTERVAL=0-999

POPULATION ITEM	TOTALS	PROMPT	15 DEC 51	25 DEC 51	15 MAY 51	15 JUN 51	5 JUL 52	25 NOV 50	SIX WIND AVERAGE
1	509674	0.2	95.0	91.7	86.7	90.0	88.6	88.3	90.0
3	153950	20.2	74.5	74.9	60.9	62.2	65.5	61.2	66.5
6	90463	33.2	61.7	63.5	49.1	50.1	54.4	50.7	54.9
7	282916	0.2	96.8	91.9	80.1	82.7	85.8	78.0	85.9
10	175861	20.5	74.1	75.3	61.3	61.1	65.3	61.0	66.4
12	172061	18.7	77.1	74.6	61.7	65.3	67.9	62.5	68.2
24	44979	30.5	62.9	66.4	49.0	49.8	54.6	51.7	55.7
25	25952	25.6	68.6	70.3	55.0	56.6	60.2	56.5	61.2
74	92623	32.8	63.5	62.2	51.8	56.0	57.6	53.8	57.5
94	86723	42.2	53.8	55.5	41.2	42.1	46.8	39.4	46.5
135	440663	0.1	95.5	91.2	86.5	90.9	89.4	88.7	90.4
148	779900	0.2	96.7	91.9	80.7	86.9	89.5	80.7	87.7
149	247491	0.2	95.5	89.9	84.9	88.8	87.1	83.2	88.3
150	64587	0.3	98.1	95.6	77.7	70.0	83.4	71.0	82.6
151	32569	0.1	96.4	94.9	79.1	81.6	88.8	72.7	85.6
152	435310	0.1	97.1	92.2	78.9	88.8	91.9	81.2	88.4
159	263030	0.2	96.5	88.4	78.6	80.1	83.5	72.6	83.3
37	55582	22.2	72.9	73.0	59.1	60.9	64.4	59.5	65.0
38	89565	0.3	96.8	91.6	80.5	83.9	87.2	79.3	86.5
39	.31439	18.7	75.1	76.4	61.3	62.2	65.7	62.3	67.2
40	51123	35.5	57.2	61.9	43.4	43.2	48.7	41.1	49.3
41	52455	29.8	63.5	65.9	51.1	49.4	53.8	49.0	55.4
42	41699	27.2	67.7	68.1	54.8	56.5	59.4	57.2	60.6
43	108469	22.7	72.5	72.7	58.8	60.8	64.4	59.8	64.9
44	21644	31.8	63.5	64.9	48.3	52.1	56.1	53.8	56.4
45	32497	17.5	78.0	76.5	62.7	65.7	69.4	63.9	69.4
46	23281	26.5	67.8	69.2	55.6	59.5	61.0	60.4	62.3
153	28376	0.1	96.8	91.6	81.2	86.6	88.8	83.3	88.1

REGION -S.CEN. ATTACK 5100 INTEGRATED DOSE INTERVAL=0-999

POPULATION ITEM	TOTALS	PROMPT	15 DEC 51	25 DEC 51	15 MAY 51	15 JUN 51	5 JUL 52	25 NOV 50	SIX WIND AVERAGE
1	429332	0.6	83.4	78.9	74.8	83.2	79.2	80.1	79.9
3	169520	18.3	61.8	56.0	50.5	61.3	61.6	64.6	59.3
6	114777	26.4	56.2	52.0	44.5	54.1	54.3	58.4	53.3
7	151832	0.5	80.7	69.9	70.8	81.6	79.2	79.0	76.9
10	202207	19.4	60.0	54.9	51.0	60.7	60.6	63.7	58.5
12	142979	14.2	67.3	59.4	51.6	65.2	65.5	69.2	63.0
24	44549	26.9	54.9	51.7	42.4	51.9	52.5	57.1	51.7
25	25801	22.8	58.5	54.4	45.9	56.2	56.8	60.9	55.5
74	98472	29.4	53.9	51.5	42.5	52.0	52.2	55.2	51.2
94	71366	27.5	46.0	40.5	30.8	41.0	47.1	49.2	42.4
135	321592	0.3	86.6	84.7	79.5	86.0	77.9	81.4	82.7
148	365893	0.6	83.5	77.5	78.2	84.8	79.6	79.8	80.6
149	205064	0.4	84.3	76.3	86.0	88.9	83.1	79.5	83.0
150	20712	2.2	79.5	66.1	54.1	69.0	67.2	80.5	69.4
151	22774	0.5	76.3	73.0	57.1	70.6	79.8	75.0	72.0
152	117907	0.6	84.3	82.6	73.0	83.1	75.8	80.6	79.9
159	133425	0.5	77.5	61.5	75.7	81.9	82.5	73.3	75.4
37	56573	20.1	60.6	55.2	48.7	58.9	59.3	63.0	57.6
38	53441	1.3	79.9	70.5	72.3	80.0	75.8	78.3	76.1
39	42628	18.9	60.6	55.1	48.9	59.5	59.2	63.3	57.8
40	41752	23.3	60.3	50.7	36.1	47.9	53.2	61.3	51.6
41	49790	22.1	53.4	48.7	42.7	51.8	56.4	55.7	51.5
42	42478	24.7	55.5	53.4	44.7	54.6	55.8	58.8	53.8
43	117375	21.8	59.9	55.1	48.3	58.3	58.5	62.0	57.0
44	21910	30.8	53.6	48.6	39.8	49.3	49.5	55.4	49.4
45	32287	15.6	65.0	56.6	51.4	64.8	63.3	68.3	61.6
46	28182	24.1	63.1	55.6	49.3	60.4	57.9	64.1	58.4
153	14690	0.6	77.9	73.5	68.0	77.7	74.6	77.6	74.9

REGION -MOUNT. ATTACK 5100 INTEGRATED DOSE INTERVAL=0-999

POPULATION ITEM	TOTALS	PROMPT	15 DEC 51	25 DEC 51	15 MAY 51	15 JUN 51	5 JUL 52	25 NOV 50	SIX WIND AVERAGE
1	856956	0.1	93.9	88.4	97.0	92.9	92.9	90.4	92.6
3	68547	9.6	84.2	75.4	82.7	77.6	79.5	80.4	80.0
6	46012	13.9	81.4	70.4	78.2	74.3	75.8	76.1	76.0
7	57070	0.2	89.5	87.9	90.7	81.5	86.5	92.8	88.2
10	87708	8.7	85.4	76.9	83.8	79.1	80.8	82.1	81.4
12	52764	11.6	81.7	73.8	81.0	74.6	77.8	77.9	77.8
24	23418	13.6	81.5	71.3	77.7	74.2	74.0	75.4	75.7
25	12139	12.1	82.2	72.7	79.8	75.2	76.1	77.0	77.2
74	35254	16.7	78.4	67.6	77.9	73.0	74.9	72.9	74.1
94	20764	21.0	75.4	64.5	70.1	66.5	66.9	68.4	68.6
135	413186	0.1	94.2	91.7	94.8	92.2	94.1	92.9	93.3
148	235616	0.4	88.7	78.4	87.2	80.3	83.5	92.6	85.1
149	98287	0.6	86.1	71.2	90.9	82.0	86.2	93.9	85.1
150	15279	0.4	83.5	83.0	87.9	71.8	82.7	92.5	83.6
151	4870	0.5	90.7	88.6	89.6	77.1	86.3	91.0	87.2
152	117207	0.3	91.4	83.3	84.0	80.2	81.3	91.5	85.3
159	50553	0.1	82.4	69.1	92.9	82.4	89.2	95.6	85.3
37	23309	11.0	83.0	73.9	80.9	76.1	77.5	78.9	78.4
38	22353	1.0	88.1	80.2	90.3	81.9	86.8	92.6	86.6
39	18373	8.7	85.3	75.6	81.8	78.1	79.2	81.8	80.3
40	16743	13.9	81.3	65.2	76.8	71.8	72.3	72.3	73.3
41	12782	19.7	73.7	67.9	70.4	64.1	68.1	73.6	69.6
42	18568	11.8	82.6	76.3	79.4	76.2	78.0	78.4	78.5
43	46771	11.8	82.1	73.0	80.4	75.3	77.4	78.6	77.8
44	9534	16.6	77.9	65.5	74.9	69.9	72.7	74.1	72.5
45	15536	8.7	86.0	77.0	80.7	76.8	78.5	82.6	80.3
46	16077	12.0	82.4	76.1	80.7	76.6	77.8	78.7	78.7
153	10596	0.2	91.8	88.9	90.8	85.5	88.6	91.5	89.5

REGION -N.WEST ATTACK 5100 INTEGRATED DOSE INTERVAL=0-999

POPULATION ITEM	TOTALS	PROMPT	15 DEC 51	25 DEC 51	15 MAY 51	15 JUN 51	5 JUL 52	25 NOV 50	SIX WIND AVERAGE
1	162957	0.7	67.9	74.1	63.8	59.3	66.2	82.2	68.9
3	46222	28.0	61.1	60.2	33.7	56.5	54.5	58.2	54.0
6	30440	39.1	52.6	52.4	25.8	49.2	47.7	47.4	45.8
7	30091	2.5	71.2	69.1	55.7	58.6	57.4	74.4	64.4
10	50088	25.8	62.6	62.2	34.2	58.1	56.2	59.4	55.5
12	46262	32.0	58.5	57.1	33.3	54.3	52.1	55.6	51.8
24	18408	36.1	54.7	54.0	27.0	50.1	48.6	51.3	47.6
25	9248	32.6	57.6	56.8	30.8	53.1	51.3	54.6	50.7
74	24168	45.0	45.4	44.4	28.1	41.8	40.6	41.9	40.4
94	32311	39.3	56.1	55.3	33.9	53.4	50.9	53.1	50.4
135	62429	0.4	56.1	56.6	59.7	41.5	46.0	69.9	55.0
148	98111	1.6	58.9	57.4	53.8	43.3	44.1	64.4	53.7
149	57546	1.3	53.0	45.4	53.1	33.6	31.4	57.0	45.6
150	11300	3.3	85.1	85.9	65.7	75.6	73.3	86.1	78.6
151	5946	4.2	87.7	85.4	44.4	70.2	66.1	86.6	73.4
152	23327	0.8	53.2	66.1	52.5	44.6	55.8	66.6	56.5
159	36570	1.4	59.7	62.9	58.1	46.1	50.4	65.5	57.1
37	16370	31.0	58.2	57.2	32.4	53.5	51.6	55.8	51.4
38	10772	2.7	65.6	63.7	50.2	49.8	49.8	70.0	58.2
39	10784	25.9	59.3	60.1	32.3	54.2	52.6	58.9	52.9
40	27160	29.8	66.7	65.6	36.1	63.3	61.6	64.9	59.7
41	12484	30.9	55.0	54.1	27.2	50.4	46.4	53.3	47.7
42	12767	37.2	53.0	51.9	28.6	48.3	45.9	48.9	46.1
43	32594	33.8	55.6	55.1	30.6	51.3	49.7	52.5	49.1
44	6889	44.6	48.5	48.3	23.6	45.1	44.0	43.7	42.2
45	10321	27.0	62.5	59.4	37.5	55.6	53.6	58.1	54.4
46	8344	30.6	60.2	59.4	31.8	56.5	54.2	56.5	53.1
153	2504	1.3	63.8	72.7	59.6	54.4	63.5	77.3	65.2

U. S. TOTALS — ATTACK 5100 — INTEGRATED DOSE INTERVAL=0-2999

POPULATION ITEM	TOTALS	PROMPT	15 DEC 51	25 DEC 51	15 MAY 51	15 JUN 51	5 JUL 52	25 NOV 50	SIX WIND AVERAGE
1	2971499	0.4	96.1	95.1	91.0	91.0	89.1	93.1	92.6
3	1784656	24.0	66.1	62.1	57.7	51.9	51.7	61.1	58.4
6	1246526	33.2	55.4	52.1	49.3	41.9	42.1	52.3	48.9
7	1343059	0.4	96.7	93.7	84.4	83.8	82.8	87.5	88.2
10	2019872	22.7	67.6	63.9	58.8	53.1	52.8	61.9	59.7
12	1653024	24.3	65.7	61.2	57.8	52.5	52.2	61.2	58.4
24	675084	31.5	55.1	51.3	47.7	38.4	39.4	52.2	47.3
25	329959	28.6	59.8	55.8	52.2	44.9	45.1	55.8	52.3
74	1103668	46.1	46.7	43.8	41.2	36.4	36.7	43.5	41.4
94	1387922	34.0	55.6	49.5	44.9	38.9	40.6	47.5	46.2
135	1750307	0.2	98.0	96.8	91.0	90.6	89.4	94.2	93.3
148	3039695	0.6	93.6	92.4	85.9	85.3	82.4	88.1	88.0
149	1331375	0.7	93.7	93.3	86.6	86.4	83.2	89.6	88.8
150	401179	1.0	87.6	83.0	80.5	78.7	77.1	78.4	80.9
151	225141	0.8	89.9	87.7	79.4	76.9	71.7	84.8	81.7
152	1076563	0.4	96.5	95.7	88.4	88.2	85.7	90.6	90.8
159	1961169	0.4	95.5	91.3	82.0	81.8	80.2	85.6	86.0
37	642352	26.2	63.7	59.6	55.6	49.7	49.6	59.0	56.2
38	424202	1.2	93.9	91.5	84.9	82.8	80.9	87.4	86.9
39	379219	21.4	68.7	64.8	60.7	54.3	53.3	64.5	61.1
40	982094	28.5	58.7	52.7	48.0	41.5	42.7	49.8	48.9
41	765932	27.0	63.0	57.1	53.8	47.7	48.3	58.4	54.7
42	443688	29.7	60.2	56.2	52.4	46.3	46.3	56.4	53.0
43	1174589	27.1	63.0	59.4	55.5	49.7	49.5	58.9	56.0
44	268623	35.6	53.5	49.4	47.3	40.4	40.4	52.4	47.2
45	337926	21.7	68.1	64.7	60.5	54.4	54.2	62.8	60.8
46	317218	30.8	59.7	57.5	52.2	47.7	45.7	57.0	53.3
153	92303	0.4	96.4	94.4	88.2	86.9	85.7	91.1	90.5

REGION -N.EAST — ATTACK 5100 — INTEGRATED DOSE INTERVAL=0-2999

POPULATION ITEM	TOTALS	PROMPT	15 DEC 51	25 DEC 51	15 MAY 51	15 JUN 51	5 JUL 52	25 NOV 50	SIX WIND AVERAGE
1	163593	1.4	73.9	53.8	75.1	75.4	75.0	66.4	69.9
3	446779	32.5	40.2	23.9	39.1	29.0	30.7	52.9	36.0
6	357939	39.5	34.3	20.0	33.4	22.1	24.0	49.9	30.6
7	91118	1.1	71.1	44.9	64.4	72.3	71.7	55.9	63.4
10	465707	30.1	41.8	25.6	40.6	30.0	31.8	55.1	37.5
12	449988	33.7	40.3	24.1	40.1	30.7	32.2	50.9	36.4
24	204904	32.3	37.4	20.3	35.8	21.5	24.0	58.3	32.9
25	93456	33.7	38.3	22.0	37.4	25.3	27.4	54.1	34.1
74	384765	66.2	20.1	10.9	18.7	14.0	15.1	26.8	17.6
94	452781	37.3	39.5	23.4	36.4	28.2	30.2	48.9	34.4
135	56329	0.8	71.5	48.4	68.4	75.9	73.1	59.9	66.2
148	229209	1.5	73.4	46.3	66.8	68.6	69.1	60.6	64.1
149	66431	2.2	73.9	43.9	61.2	58.2	63.7	65.9	61.1
150	96556	1.0	71.1	45.7	71.0	76.6	75.0	59.4	66.5
151	40137	1.5	77.0	48.7	66.9	64.1	60.5	62.6	63.3
152	26105	1.4	75.0	51.2	65.4	72.4	73.9	48.4	64.4
159	164942	0.9	75.2	42.8	62.5	65.4	67.7	60.9	62.4
37	170972	34.3	39.3	23.4	38.4	28.1	29.8	51.6	35.1
38	34351	3.4	69.1	42.4	64.3	63.7	63.9	61.5	60.8
39	87191	28.3	43.0	25.1	42.5	30.3	31.3	57.4	38.3
40	305811	27.7	43.8	25.0	42.1	31.8	33.8	56.1	38.8
41	265616	35.6	41.5	26.0	39.3	28.8	31.3	48.6	35.9
42	118945	37.9	35.0	19.6	32.8	24.0	25.5	49.5	31.1
43	297900	36.3	36.9	22.2	36.4	26.4	28.1	50.6	33.4
44	86053	43.3	32.1	17.0	30.7	19.3	21.3	48.6	28.2
45	82973	28.8	41.8	26.4	42.8	32.5	33.8	56.0	38.9
46	77800	36.7	37.6	25.1	37.5	28.3	29.2	50.3	34.7
153	5010	0.9	71.1	46.7	68.1	75.7	74.1	57.1	65.5

REGION -S.EAST | ATTACK 5100 | INTEGRATED DOSE INTERVAL=0-2999

POPULATION ITEM	TOTALS	PROMPT	15 DEC 51	25 DEC 51	15 MAY 51	15 JUN 51	5 JUL 52	25 NOV 50	SIX WIND AVERAGE
1	447603	0.3	99.5	98.9	86.0	84.4	81.6	92.8	90.5
3	380213	11.6	87.9	86.2	74.4	72.2	67.6	80.4	78.1
6	206811	19.9	79.5	76.5	67.9	65.7	59.9	73.2	70.4
7	440215	0.2	99.7	99.7	87.9	84.8	83.5	92.0	91.3
10	439169	11.2	88.4	86.8	74.7	72.7	68.0	80.9	78.6
12	315169	11.3	88.2	86.4	75.2	72.2	67.6	80.6	78.4
24	93789	23.3	76.1	73.3	58.7	56.6	50.8	68.8	64.0
25	55109	17.1	82.3	79.9	67.6	65.4	60.0	74.9	71.7
74	152237	21.2	78.3	75.7	66.3	62.5	57.6	70.9	68.5
94	195435	13.7	85.6	85.6	72.1	67.2	64.6	75.0	75.0
135	236925	0.2	99.7	99.6	86.7	83.8	82.2	92.4	90.7
148	528412	0.3	99.6	98.7	86.4	83.4	79.5	92.4	90.0
149	293619	0.2	99.7	98.6	91.2	88.3	84.5	93.9	92.7
150	53851	0.6	99.1	96.9	74.1	75.1	66.1	85.0	82.7
151	71310	0.5	99.5	99.2	75.9	74.5	71.6	97.4	86.4
152	103448	0.3	99.6	99.5	85.6	79.2	76.6	88.4	88.1
159	778310	0.2	99.7	98.8	88.5	87.3	84.2	94.7	92.2
37	128971	13.5	86.0	84.2	72.7	71.0	66.3	79.2	76.6
38	120665	0.5	99.4	98.4	88.0	85.4	81.8	92.3	90.9
39	87450	11.6	88.0	85.2	74.1	73.2	67.1	81.4	78.2
40	122760	13.2	85.2	84.3	71.7	68.8	65.4	77.8	75.5
41	183746	7.9	91.9	91.4	77.4	77.5	74.5	86.1	83.1
42	81201	17.4	82.1	79.6	68.3	65.7	59.8	74.1	71.6
43	227604	14.0	85.5	83.2	72.9	71.1	65.7	78.9	76.2
44	45079	20.4	79.2	75.5	66.3	65.9	59.0	73.0	69.8
45	66285	12.4	87.2	85.6	73.0	70.8	67.0	79.8	77.2
46	77608	30.3	69.5	68.3	53.1	51.6	48.1	63.7	59.0
153	13755	0.2	99.6	99.3	84.9	81.7	78.7	90.2	89.1

REGION -E.N.C. | ATTACK 5100 | INTEGRATED DOSE INTERVAL=0-2999

POPULATION ITEM	TOTALS	PROMPT	15 DEC 51	25 DEC 51	15 MAY 51	15 JUN 51	5 JUL 52	25 NOV 50	SIX WIND AVERAGE
1	244811	1.1	98.0	92.6	70.1	71.0	74.1	69.9	79.3
3	362252	31.1	68.2	59.3	36.4	39.6	44.8	34.5	47.1
6	264368	41.6	58.0	49.6	29.1	32.5	38.4	26.2	39.0
7	256227	0.6	98.7	91.8	64.1	67.8	69.4	66.7	76.4
10	424715	30.3	69.2	60.3	36.7	40.5	45.9	34.1	47.8
12	336007	30.0	69.1	60.5	38.3	41.2	45.6	38.7	48.9
24	157831	39.0	60.6	52.8	29.8	32.4	39.6	25.0	40.0
25	71985	35.2	64.2	55.7	33.0	36.2	41.9	30.2	43.5
74	215192	51.2	48.5	42.0	24.3	26.9	31.9	24.6	33.0
94	407382	38.7	60.9	50.8	28.1	33.1	39.0	28.7	40.1
135	161541	0.5	98.6	92.9	66.9	68.5	72.2	67.7	77.8
148	520343	1.0	98.7	93.1	66.3	70.8	73.3	68.0	78.4
149	191030	1.7	98.2	93.4	61.0	69.0	72.0	63.2	76.1
150	106538	0.5	98.9	91.6	74.9	73.6	79.6	76.0	82.4
151	26556	0.6	98.9	90.3	63.4	65.5	61.2	68.5	74.7
152	196279	0.5	99.1	93.9	67.2	71.6	72.9	68.4	78.9
159	423744	0.7	99.0	91.6	60.9	65.7	66.9	61.9	74.3
37	132985	33.2	66.2	57.6	35.1	38.4	43.3	33.5	45.7
38	67174	1.7	97.7	91.0	65.4	67.3	70.7	66.9	76.5
39	65183	29.0	70.4	61.7	37.7	40.2	46.2	34.9	48.5
40	325222	33.3	66.0	55.9	32.4	36.7	41.9	30.6	43.9
41	141252	34.9	64.8	54.9	32.7	36.0	39.6	33.2	43.5
42	88648	37.2	62.1	54.6	33.1	33.9	41.0	29.7	42.4
43	235700	34.0	65.4	57.2	34.9	38.2	43.2	33.3	45.4
44	48377	43.1	56.5	49.7	27.9	31.8	37.0	26.2	38.2
45	66371	27.0	72.5	64.7	41.8	43.6	48.7	34.2	50.9
46	50521	38.5	61.1	51.7	30.8	37.4	41.3	32.0	42.4
153	13672	0.4	98.7	92.7	71.3	71.9	76.2	71.6	80.4

REGION -W.N.C. ATTACK 5100 INTEGRATED DOSE INTERVAL=0-2999

POPULATION ITEM	TOTALS	PROMPT	15 DEC 51	25 DEC 51	15 MAY 51	15 JUN 51	5 JUL 52	25 NOV 50	SIX WIND AVERAGE
1	509674	0.2	99.8	99.8	98.8	95.2	95.7	99.6	98.2
3	153950	20.2	79.8	79.8	79.2	72.3	74.0	79.3	77.4
6	90463	33.2	66.7	66.7	66.6	60.3	62.2	66.3	64.8
7	282916	0.2	99.8	99.8	98.3	92.5	93.9	99.2	97.3
10	175861	20.5	79.5	79.5	79.1	72.2	73.8	79.0	77.2
12	172061	18.7	81.3	81.3	80.2	73.7	75.6	80.8	78.8
24	44979	30.5	69.5	69.5	69.2	62.2	63.5	69.2	67.2
25	25952	25.6	74.4	74.4	74.0	67.2	68.8	74.C	72.1
74	92623	32.8	67.2	67.2	66.7	61.8	63.1	66.9	65.5
94	86723	42.2	57.8	57.8	57.8	52.1	54.0	57.4	56.2
135	440663	0.1	99.9	99.9	98.8	95.7	96.1	99.6	98.4
148	779900	0.2	99.9	99.9	98.6	94.7	95.3	99.4	97.9
149	247491	0.2	99.8	99.8	99.0	95.2	93.3	99.0	97.7
150	64587	0.3	99.7	99.7	98.7	87.4	95.7	99.3	96.7
151	32569	0.1	99.9	99.9	98.5	92.9	96.5	99.5	97.9
152	435310	0.1	99.9	99.9	98.4	95.6	96.3	99.6	98.3
159	263030	0.2	99.8	99.8	98.4	90.4	91.8	99.0	96.5
37	55582	22.2	77.9	77.9	77.2	70.7	72.5	77.4	75.6
38	89565	0.3	99.7	99.7	98.2	92.9	94.4	99.1	97.3
39	31439	18.7	81.3	81.3	80.7	73.2	75.2	80.8	78.7
40	51123	35.5	64.5	64.5	64.4	57.0	58.6	64.2	62.2
41	52455	29.8	70.2	70.2	69.8	62.1	63.9	69.4	67.6
42	41699	27.2	72.7	72.7	72.2	65.3	66.9	72.3	70.4
43	108469	22.7	77.3	77.3	76.8	70.2	72.1	76.8	75.1
44	21644	31.8	68.2	68.2	67.8	61.5	63.2	67.9	66.2
45	32497	17.5	82.5	82.5	81.8	76.1	77.7	82.1	80.4
46	23281	26.5	73.5	73.5	73.0	67.9	68.9	73.2	71.7
153	28376	0.1	99.9	99.9	98.3	93.9	95.8	99.6	97.9

REGION -S.CEN. ATTACK 5100 INTEGRATED DOSE INTERVAL=0-2999

POPULATION ITEM	TOTALS	PROMPT	15 DEC 51	25 DEC 51	15 MAY 51	15 JUN 51	5 JUL 52	25 NOV 50	SIX WIND AVERAGE
1	429332	0.6	99.4	95.9	89.6	91.8	86.6	99.4	93.8
3	169520	18.3	81.7	76.8	71.2	69.9	67.3	81.7	74.8
6	114777	26.4	73.6	69.1	64.4	61.6	59.6	73.6	67.0
7	151832	0.5	99.5	94.7	89.4	89.6	85.9	99.5	93.1
10	202207	19.4	80.6	75.4	70.4	69.1	66.1	80.6	73.7
12	142979	14.2	85.7	82.0	74.3	74.4	71.6	85.7	79.0
24	44549	26.9	73.1	68.9	63.9	59.7	57.4	73.1	66.0
25	25801	22.8	77.2	72.7	67.3	64.5	62.1	77.2	70.1
74	98472	29.4	70.6	67.1	63.0	58.9	57.5	70.6	64.6
94	71366	27.5	72.5	64.6	64.1	52.8	53.0	72.5	63.2
135	321592	0.3	99.7	97.4	92.2	92.0	86.1	99.7	94.5
148	365893	0.6	99.4	95.9	91.9	91.1	86.7	99.4	94.1
149	205064	0.4	99.6	95.3	93.5	92.5	90.3	99.6	95.1
150	20712	2.2	97.8	94.1	82.9	87.5	75.4	97.8	89.2
151	22774	0.5	99.5	97.8	91.2	88.1	84.6	99.5	93.4
152	117907	0.6	99.4	97.1	91.0	90.0	83.0	99.4	93.3
159	133425	0.5	99.5	91.3	90.2	88.5	88.0	99.5	92.8
37	56573	20.1	79.9	75.4	69.6	67.5	65.0	79.9	72.9
38	53441	1.3	98.7	94.1	89.0	87.7	83.1	98.7	91.9
39	42628	18.9	81.1	76.1	69.6	68.3	65.7	81.1	73.7
40	41752	23.3	76.7	73.5	64.8	64.2	56.4	76.7	68.7
41	49790	22.1	77.9	69.7	67.1	60.3	61.4	77.9	69.1
42	42478	24.7	75.3	71.2	65.9	62.9	60.5	75.3	68.5
43	117375	21.8	78.2	73.9	68.5	66.3	64.0	78.2	71.5
44	21910	30.8	69.2	65.9	59.6	57.0	54.7	69.2	62.6
45	32287	15.6	84.4	80.1	72.7	73.0	70.7	84.4	77.6
46	28182	24.1	75.9	73.1	66.1	67.6	63.8	75.9	70.4
153	14690	0.6	99.4	95.0	88.5	86.9	81.9	99.4	91.8

POPULATION ITEM	REGION -MOUNT. TOTALS	PROMPT	ATTACK 5100 15 DEC 51	25 DEC 51	15 MAY 51	INTEGRATED DOSE INTERVAL=0-2999 15 JUN 51	5 JUL 52	25 NOV 50	SIX WIND AVERAGE
1	856956	0.1	98.8	98.8	98.9	98.6	99.1	99.9	99.0
3	68547	9.6	90.4	89.7	87.7	84.1	88.7	90.4	88.5
6	46012	13.9	86.1	85.5	83.8	78.8	85.1	86.1	84.2
7	57070	0.2	99.2	99.2	95.0	96.7	94.6	99.8	97.4
10	87708	8.7	91.2	90.6	88.8	84.9	89.7	91.2	89.4
12	52764	11.6	88.4	87.9	85.2	83.1	86.4	88.4	86.6
24	23418	13.6	86.4	85.8	83.8	79.0	85.2	86.4	84.4
25	12139	12.1	87.9	87.3	85.2	81.0	86.4	87.9	86.0
74	35254	16.7	83.3	82.8	80.8	79.2	81.8	83.3	81.9
94	20764	21.0	79.0	78.8	76.6	71.6	77.8	79.0	77.1
135	413186	0.1	99.7	99.7	98.0	97.7	98.4	99.9	98.9
148	235616	0.4	97.2	97.2	92.7	95.8	91.3	99.6	95.6
149	98287	0.6	95.2	95.2	94.8	96.8	93.7	99.4	95.8
150	15279	0.4	99.5	99.5	92.4	93.3	93.3	99.6	96.3
151	4870	0.5	99.4	99.4	94.8	93.3	94.8	99.5	96.9
152	117207	0.3	98.6	98.6	90.9	95.4	88.9	99.7	95.3
159	50553	0.1	92.6	92.6	95.9	98.8	94.7	99.9	95.7
37	23309	11.0	89.0	88.3	86.2	82.8	87.3	89.0	87.1
38	22353	1.0	97.2	97.2	94.9	95.6	94.6	99.0	96.4
39	18373	8.7	91.3	90.7	87.5	84.2	89.7	91.3	89.1
40	16743	13.9	86.1	85.9	83.5	78.2	85.5	86.1	84.2
41	12782	19.7	80.3	80.0	77.5	71.9	78.5	80.3	78.1
42	18568	11.8	88.2	87.3	84.9	82.2	86.7	88.2	86.3
43	46771	11.8	88.2	87.5	85.6	81.8	86.7	88.2	86.4
44	9534	16.6	83.4	82.9	80.9	75.4	81.9	83.4	81.3
45	15536	8.7	91.3	90.8	87.5	83.6	89.3	91.3	88.9
46	16077	12.0	88.0	86.9	85.6	81.2	87.1	88.0	86.1
153	10596	0.2	99.2	99.2	95.6	96.8	94.9	99.9	97.6

POPULATION ITEM	REGION -N.WEST TOTALS	PROMPT	ATTACK 5100 15 DEC 51	25 DEC 51	15 MAY 51	INTEGRATED DOSE INTERVAL=0-2999 15 JUN 51	5 JUL 52	25 NOV 50	SIX WIND AVERAGE
1	162957	0.7	99.3	99.3	89.0	98.3	99.3	99.3	97.4
3	46222	28.0	72.0	72.0	67.6	71.9	72.0	72.0	71.2
6	30440	39.1	60.9	60.9	57.6	60.9	60.9	60.9	60.3
7	30091	2.5	97.5	97.5	85.3	97.3	97.5	97.5	95.4
10	50088	25.8	74.2	74.2	69.7	74.1	74.2	74.2	73.4
12	46262	32.0	68.0	68.0	63.8	68.0	68.0	68.0	67.3
24	18408	36.1	63.9	63.9	60.9	63.8	63.9	63.9	63.4
25	9248	32.6	67.4	67.4	63.7	67.3	67.4	67.4	66.8
74	24168	45.0	55.0	55.0	51.4	54.9	55.0	55.0	54.4
94	32311	39.3	60.7	60.7	58.2	60.6	60.7	60.7	60.3
135	62429	0.4	99.6	99.6	84.6	97.6	99.6	99.6	96.7
148	98111	1.6	98.4	98.4	82.6	98.2	98.4	98.4	95.7
149	57546	1.3	98.7	98.7	82.1	98.6	98.7	98.7	95.9
150	11300	3.3	96.7	96.7	91.3	96.6	96.7	96.7	95.8
151	5946	4.2	95.8	95.8	90.6	95.8	95.8	95.8	94.9
152	23327	0.8	99.2	99.2	77.5	98.6	99.2	99.2	95.5
159	36570	1.4	98.6	98.6	84.0	98.5	98.6	98.6	96.2
37	16370	31.0	69.0	69.0	64.7	69.0	69.0	69.0	68.3
38	10772	2.7	97.3	97.3	82.1	97.2	97.3	97.3	94.8
39	10784	25.9	74.1	74.1	69.5	74.1	74.1	74.1	73.3
40	27160	29.8	70.1	70.1	68.3	70.0	70.1	70.1	69.8
41	12484	30.9	69.1	69.1	65.3	69.1	69.1	69.1	68.5
42	12767	37.2	62.8	62.8	58.9	62.8	62.8	62.8	62.2
43	32594	33.8	66.2	66.2	61.6	66.2	66.2	66.2	65.4
44	6889	44.6	55.4	55.4	52.5	55.4	55.4	55.4	55.0
45	10321	27.0	73.0	73.0	68.9	72.9	73.0	73.0	72.3
46	8344	30.6	69.4	69.4	66.4	69.3	69.4	69.4	68.9
153	2504	1.3	98.7	98.7	85.3	98.0	98.7	98.7	96.4